The
Geographical Journal.

No. 4. APRIL, 1895. Vol. V.

THE LUCHU ISLANDS AND THEIR INHABITANTS.*

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I. Introductory Remarks.

Most educated persons are aware that the Pacific Ocean holds somewhere or other an island or islands called Luchu, and the more elderly may perhaps remember to have heard something of a British exploring expedition sent there early in the century. But being a place which the globe-trotter cannot reach with comfort, and which offers to men-of-war no inducements in the way of coal or good harbours, it receives scarcely any visits from Europeans, and there is probably to-day no part of the world equally civilized that is so little known. So completely, indeed, does Luchu lie out of the way, not only of travellers, but of book-makers, that after the lapse of three-quarters of a century Captain Basil Hall's work, entitled, 'Account of a Voyage of Discovery to the West of Corea and the Great Loo-choo Island,' and published by Murray in 1818, still remains the chief authority on the subject. At the time of my own visit in the spring of last year, the only European in the whole archipelago was the Abbé Ferrié, a French Catholic missionary, who, however, lived in the northern island of Oshima, which does not form part of Luchu in the narrower sense of the word; and the only occasional visitor (also to Oshima) was Mr. Alfred Unger, of the firm of Boehmer & Co., florists, of Yokohama. My own opportunities, though unfortunately not permitting of a visit to the smaller outlying isles, were excellent for seeing both land and people in Great Luchu, as the time of year favoured travel in that warm region, and letters of introduction

* Paper read at the Royal Geographical Society, January 7, 1895. Map, p. 408.

from the Japanese Foreign Office threw open all official sources of information, while nothing could exceed the hospitality of the native aristocracy as soon as they learnt that their strange visitor was neither missionary nor merchant, and that he could speak Japanese, which is the French of those parts. These circumstances may perhaps justify a somewhat minute account of what I saw and heard. Many items have never been described before for European readers—the marriage customs, for instance, and the two systems of ideographs. The present paper will fulfil its object if it succeeds in showing that the Luchus are no mere barbarous islands, but that, on the contrary, they possess a complex civilization, an ancient and checkered history, and a language capable of throwing welcome light on Far-Eastern philology; that, in fact, these minute specks on the map expand when properly studied, and become as full of varied interest as a drop of water or an ant's brain when placed under the naturalist's microscope.

My special thanks are due to Mr. Narabara, Governor of the archipelago; to Mr. Takeshita, late Chief Inspector of Police there; to Mr. Nishi, Mayor of Shuri; to the learned botanist, Mr. Tashiro, who has devoted years to a scientific exploration of the Further Isles; to Mr. Tamura, a Japanese planter resident in the island of Ishigaki; and to Mr. Alfred Unger, who has favoured me with several photographs. Mr. H. C. Litchfield, barrister, of Yokohama, placed in my hands the manuscript of an account of a visit to Luchu by the late Mr. H. Pryer; but unfortunately it was in too fragmentary a condition to make much use of, and contained scarcely anything on Mr. Pryer's special subject—lepidoptera—beyond an expression of disappointment with the specimens obtained.

II. Geography and Natural Characteristics.

Taken in its widest acceptation, Luchu is the name of the whole chain of islands stretching from the south-western extremity of Japan to near the north-eastern extremity of Formosa. Taken in its narrowest sense, it denotes only the central island, Great Luchu, or this island with its smallest immediate neighbours, while other names are applied to the other sub-groups of the archipelago. Historical considerations partly explain this ill-defined usage of the term, the limits of the recently extinguished Luchuan kingdom and the nature of the Japanese claims to some of the islands having varied from time to time, as will be seen in Section III. A further cause of confusion has been the habit common to European navigators of naming and re-naming islands and groups of islands more or less at pleasure, and of mixing up their own nomenclature with the native names imperfectly understood. If we are to take early history as our standard, the Luchu islands begin at the very mouth of the Gulf of Kagoshima, in southern Japan. Are popular customs and physical features to be our guides? Then Luchu

begins only at Amami-Oshima. Shall we follow modern Japanese administrative parlance? Then the northern half of the archipelago must be omitted altogether, because incorporated centuries ago with Japan proper, and there remain only Great Luchu and the Further Isles. So arbitrary a question can never be satisfactorily settled, for it depends on a definition of terms which every one is free to define as he sees fit. Another moot point is, which of the islands shall be enumerated by name, and which omitted as too insignificant? Thirty-six is the number always given by Luchuans and Japanese alike, and it corresponds very fairly well with fact if the entire archipelago be included. When, however, the northern part of the archipelago is omitted, the orthodox number has to be made up by adding some of the very small islands to the list.

Taking the name "Luchu" in its widest sense for the purposes of this paper, and adopting the subdivisions familiar to Japanese geographers, we find that there are altogether thirty-six principal islands, which fall into six groups, as follows:—

I. *The North-Eastern Group*, accounted as belonging to the Japanese province of Osumi. It includes—

1. TANE-GA-SHIMA (*Tanega sima* of British Admiralty Chart, No. 2,412), long in shape—some 32 miles by 5—comparatively low (highest point 1,200 feet), and admirably cultivated with rice and other crops. This island is noted in history as the first point of Japanese, or quasi-Japanese, soil trodden by Europeans, the Portuguese adventurer Mendez Pinto having landed here in the year 1542, and astonished the natives so greatly by his firearms, that a pistol is still sometimes called a *tanega-shima* in colloquial Japanese. The population numbers over 23,000 (census of 1890).

2. MAKE-JIMA (*Mage no Sima* of the chart), a mere islet, used for raising a few cattle, and also resorted to by fishermen.

3. YAKU-NO-SHIMA (*Yakuno sima* of the chart), a circular island of some 15 miles diameter, covered with luxuriant forests, where grow the celebrated *yaku-sugi*, the variety of cryptomeria most prized for its timber. The knot of mountains forming this fine island attains a height of over 6000 feet, thus surpassing any peak on the mainland of southern Japan. Whether its origin be volcanic or not, like its mainland neighbours, has not yet been determined. The inhabitants, who number some 8,800, enjoy the reputation of an almost idyllic simplicity. Doors need neither locks nor bolts in this happy island, where theft is unknown; and a man hanging up his coat on a bush will be sure to find it untouched when next he passes by that way.

4. KUCHI-NO-ERABU-SHIMA (*Nagarobe* or *Yerabu* of the chart), 6 miles long by 5 broad, is an active volcano over 2,200 feet high.

II. *The North-Western Group.* This group, which is accounted part of the Japanese province of Satsuma, consists of three small islands, called—

5. TAKE-SHIMA (*Take Sima* of the chart), 740 feet high.

6. IWO-GA-SHIMA (*Iwoga Sima* of the chart), lit. "Sulphur Island."* The burnt red and yellow aspect of this island cone, rising over 2,300 feet sheer out of the sea, is most desolate; but the sulphur, which gives it its name, forms a valuable source of income.

7. KURO-SHIMA (*Kuro Sima* of the chart), 3 miles long by 2½ wide, and over 2,000 feet high.

III. The *Shichi-to*, lit. "Seven Isles" † ("Linschoten Islands" of the chart). These too are all very small, though mostly high, and some are active volcanoes. A few poor families manage to pick up a living even under circumstances so unfavourable; but this group, like the last, lacks all practical importance. Its chief interest is the danger it offers to navigation. The names of the islands are—

8. KUCHI-NO-SHIMA (*Kutsino-sima* or *Yerabout* ‡ of the chart), 2,230 feet high.

9. GAJA-SHIMA or HEBI-SHIMA (*Hebi-sima* or *Dundas Island* of the chart), 1,687 feet.

10. NAKA-NO-SHIMA (*Naka-sima* or *Pinnacle* of the chart), 3,400 feet.

11. HIRA-SHIMA (*Fira-sima* or *Disaster* of the chart), 812 feet.

12. SUWA-NO-SE-JIMA (*Suwa-sima* or *Archimedes* of the chart), an active volcano, 2,706 feet high.

13. AKUISHI-JIMA (*Akuisi-sima* or *Samarang* of the chart), 1,978 feet.

14. TOKARA-SHIMA (*Tokara-sima* or *Pennell* of the chart), 860 feet.

15. YOKO-SHIMA (*Yoko-sima* or *Ogle* of the chart), 1,700 feet.

IV. *The Oshima Group*, originally subject to the Kings of Luchu, but conquered and incorporated with his domains by the Prince of Satsuma in 1610, and now under the jurisdiction of the Japanese Prefecture of Kagoshima. This group, sometimes also called *Shō-Ryūkyū*, that is, Small Luchu, consists of—

16. *Oshima*,§ or more fully Amami-Oshima (*Anami Oö Sima* or *Harbour Island* of the chart ‖). This, the second largest member of the

* The 'China Sea Directory' gives it the alternative name of "Volcano Island," reserving the name of "Sulphur Island" for one further to the south.

† There are really eight, but "Seven Isles" is a favourite number with the Japanese; take, for instance, the *Izu Shichi-to*, or "Seven Isles of Izu," to the south of Yokohama. With regard to the term "Linschoten Islands," the 'China Sea Directory' includes under it Tane-ga-shima, Make-jima, and Yaku-no-shima; but the chart writes the name so as to cover the Seven Isles (*Shichi-tō*) only.

‡ Evidently by confusion with *Erabu-* (also written *Yerabu-*) *shima*. But whence the final *t*? Perhaps from some French mariner, who might naturally write the sound *abu* as *about*.

§ Oshima, lit. "Big Island," is a name of perplexingly frequent recurrence off the Japanese coast. Hence the plan of prefixing some more definite appellation, to distinguish each particular Oshima from its homonyms. Thus we have *Izu no O hima* (Vries Island), off the coast of the province of Izu, etc.

‖ Chart No. 873 spells *Amami* properly, and so does the 'China Sea Directory.' But all have *Oo Sima* for Oshima.

entire Luchuan archipelago, is some 30 miles long by 17 wide at the south-western end, which is the broadest part. It is a maze of hills, which rise in the south to over 2,000 feet; but none of them are volcanoes, and Oshima is said to be entirely free from earthquake shocks. Lying, as the island does, directly in the way of the *Kuroshiwo*, or Japanese Gulf Stream, the climate is excessively humid. Few days pass entirely without rain; and even when it is not actually raining, clouds and mist often obscure the sun. This state of things, disastrous in such a latitude (28° 20′) to European health, favours, as a hothouse might do, the growth of a luxuriant vegetation, amongst which cycads and tree-ferns most strike the eye. It likewise favours the propagation of many lower forms of animal life, especially the dreaded Trimeresurus snake, of which more later on. Naze, the chief port of Oshima, lies on the north-western side of the island. It is a very dull little place, built in Japanese style and boasting a Japanese inn. The native dialect, essentially Luchuan in character, has been overlaid by the Satsuma dialect of Japanese, and forms a patois in various stages of degradation and hybridism according as the speaker belongs to town or country. The population is 51,000.

17. KAKEROMA-SHIMA (*Kageroma Sima* of the chart) is a very narrow island some 12 miles long, plastered up, if one may so say, against the southern coast of Oshima, from which it is separated by a narrow channel known to English mariners as Oo-sima, or Porpoise Strait. It boasts several small ports of export, and its coasts are much resorted to by fishermen from Great Luchu. To its south lie the small but high islands of—

18. YORO-SHIMA (*Ioro Sima* of the chart), 1,000 feet; and

19. UKE-SHIMA (*Uke Sima* of the chart), 1,353 feet.

20. KIKAI-GA-SHIMA or KIKAI-JIMA (*Kikai-ga-sima* or *Bungalow Island* of the chart) is nearly 7 miles long by 2½ wide, and 864 feet high. It is almost timberless, so that the inhabitants, who number over 15,000, are driven to the use of horse and cow-dung for fuel. It is noted as producing the best sugar and the best mats (known as *Ryūkyū-omote*) in the whole archipelago. Popular superstition represents it as having anciently been the abode of demons, whence its name, which means literally "Demon World."

21. TOKU-NO-SHIMA (*Kakirouma*,* *Tok-sima*, or *Crown Island* of the chart), 15 miles long by 9 broad, and 2,200 feet high. This island and the two to be next mentioned are well-wooded, and produce considerable quantities of sugar.

22. OKI-NO-ERABU-SHIMA (*Yerabu Sima* or *Oukin*† of the chart), 9½ miles long, from 2 to 5 miles wide, and 687 feet high.

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* Apparently by confusion with Kakeroma-shima.

† Apparently a corruption of the first three syllables of the real name.

23. YORON-JIMA (*Yori-sima* or *Yuru Island* of the chart) is a roundish island about 3 miles in diameter, and over 400 feet high.

It has already been stated that Group I. forms part of the Japanese province of Osumi, and Group II. of the province of Satsuma. These ancient provinces are now united for administrative purposes in the single prefecture of Kagoshima, in which Groups III. and IV. are also included. The Central and Southern Groups (V. and VI.) about to be enumerated, that is, Luchu Proper and the Further Isles, have been erected into a separate prefecture called the *Okinawa Ken*.

V. *The Central Group*, or Luchu Proper, the chief member of which is—

24. OKINAWA OR GREAT LUCHU. This, the largest and by far the most important island in the whole archipelago, has a length of 56 miles, with a breadth varying from 2 to 14 miles. It has, from the most ancient times, been divided into three parts called Kunchan, Nakagami, and Shimajiri. The first or northernmost of these (also popularly known by the name of Yambara) is rough and mountainous, rising to a height of some 1,500 feet, wooded in parts, in parts barren, and everywhere but sparsely inhabited, such inhabitants as there are being despised for their poverty and rough speech and manners by the natives of the central and southern provinces. These provinces—Nakagami and Shimajiri—consist of open rolling country with low hills in the centre, are admirably cultivated, and thickly populated. The streams here, as on the other islands, though numerous, are necessarily very short, the longest attaining to a length of only about 6 miles. There is a curious stalactitic cave at Futemma, 10 miles from Nafa. The three provinces of Great Luchu are subdivided into districts termed *magiri*, of which there are nine in Kunchan, eleven in Nakagami, and fifteen in Shimajiri, the highly civilized central and southern provinces being thus much more minutely subdivided than the barren northern moor and forest land. A like division into *magiri* obtains in all the islands formerly subject to the Luchuan kings. The term, though now unknown in Japan, is said to have been current in Satsuma in ancient days. The best harbour in Great Luchu is Unten (*Port Melville* of the British charts), on the north-west coast; but it is, so to say, wasted, because situated in a hilly district remote from the centres of population and trade. For this reason the Japanese steamers and most junks repair to Nafa (or Naha or Naba, as the Japanese sometimes pronounce it), in Shimajiri, near the southern extremity of the island, which is much less good, the inner harbour being only accessible at high tide. Close to Nafa, and indeed practically forming one with it, are the towns of Tomari and Kume-mura. Shuri, the capital (called Shui by the modern Luchuans, who habitually drop the *r* in the middle of words), crowns a hill some 400 feet high standing a little over three miles inland from Nafa. No other place in the archipelago approaches Shuri or Nafa in size, and the two form a

striking contrast, Nafa being a busy port, the seat of the Japanese administration, and altogether much Japonized in appearance and in the manners of its inhabitants, whereas Shuri remains quite old-world. The castle of Shuri is a delightfully picturesque relic of early days.

The other members of the Central Group, except Kume-jima, are small and quite unimportant. They are as follows:—

25. Tori-shima or Iwo-zan * (*Iwo sima* or *Sulphur Island* of the chart). This is a volcanic cone some 540 feet high, and still active. It is the southernmost volcanic member of the Luchuan archipelago.

26. Ihiya-jima (*Yebeya sima* of the chart), 7 miles long by nearly 2 wide, and 963 feet high.

27. Izena-shima (*Isena sima* of the chart), a mere islet 403 feet high. The British naval authorities unite these last two islands under the common name of *Montgomery Group*.

28. Ie-shima (*Iye Island* or *Sugarloaf* of the chart), 4½ miles long by 1¾ broad, and 575 feet high.

29. Akuni-jima (*Agunyeh* of the chart), 3 miles long by 2 broad, and 300 feet high.

30. Tonaki-jima (*Tunashee* of the chart), a mere islet 603 feet high.

31. Kerama-jima is a group, whose small detached eastern members are called Mae-jima (*Maikirima* of the chart) and Kuro-shima (*Koru-sima* or *Saddle Island* of the chart). The white cliffs of Mae-jima form a striking feature in the view seaward from Nafa and south-eastern Luchu generally. The large central island is called Tokashiki-jima, while the smaller western members are collectively known by the name of Nishi-Kerama, their individual names being respectively Zamami-jima, Yagahi-jima, Aka-shima, Kuba-shima, and Keruma-jima. The chart writes Yagahi as *Yakang*, Kuba as *Kupa*, and does not name Keruma at all. The island between Keruma on the south and Aka on the north seems to have no name even in Japanese, the three islands being in some mysterious way considered as only two. The 'China Sea Directory' includes all three under the general name of *Aka sima*. The principal village and anchorage of the Kerama Group is Ago-no-ura, in the island of Zamami.

32. Kume-jima (*Komisang* of the chart) is some 6 miles long, also 6 miles wide in the widest part, and has two peaks—a southern one 1,028 feet high, and a northern 1,108 feet high. It has a fine waterfall visible from the sea. This outlying but thickly populated little island is one of the most noted in the archipelago, owing to the *Ryukyu-tsumugi*, a silk fabric which is exported to Japan and much prized in that country. The principal village, called Kana-gusuku-hama, is situated on the south-western coast.

* Though lying so far north as to seem more naturally included in the Oshima Group, this island is always accounted as forming one of the Central Group, because it belonged politically to Great Luchu.

VI. *The Saki-shima Group*, or "Further Isles." In the British Admiralty Charts 2,412 and 2,105 it is styled *Meiaco-sima* or *Yayeyama Group;* but both these designations are founded in misapprehension, Miyako-jima being really the individual name of the easternmost large island (*Taipinsan Island* of chart 2,412 *) with its tiny satellites, while Yayeyama (or Yaeyama) is a general name for the two large western islands of Ishigaki-jima and Iri-omote-jima (*Pa-chung-san* and *Ku-kien-san* or *Nishiomote Sima* of the chart), with their satellites. Yonakuni-jima (*Kumi* of the chart †) stands alone. It may be added that Tai-pin-san, Pa-chung-san, and Ku-kien-san are Chinese names for the islands. The Saki-shima or Further Isles are enumerated as follows:—

33. Miyako-jima, 17 miles long by 5½ wide. It and its neighbouring islets are comparatively low, nowhere much exceeding 300 feet. They lack timber, but are thickly populated. Water is often scarce, and in the hollows where it is kept it goes up and down with the tide. The names of the islets are Ogami-jima (*Hummock Island* of the chart), Ikema-jima (*Coruma* of the chart), (Oku-no-) Erabu-shima (*Yerrabu* of the chart), Shimoji-shima, Kuruma-jima (*Kurimah* of the chart), and—some way further to the west—Minna-jima (*Mitsuna* of the chart), and Tarama-jima (*Tarara* of the chart). The British Admiralty chart names, as will be noticed, are more than usually faulty in the case of this sub-group. It will be observed, also, that the chart gives no name at all to Shimoji-shima, but makes the latter form one with Erabu-shima by omitting the extremely narrow channel between these twin islands, and that it thus causes what are really two to appear as one. The Japanese Admiralty chart, on the contrary, which dates from 1888, is very carefully executed. Miyako-jima was the first point of Luchuan land with which British mariners became acquainted, H.M.S. *Providence*, Captain Broughton, having been wrecked about a century ago on the great *Yayebise*, or Providence Reef, which stretches to the north of it. In 1863, the German ship *R. J. Robertson* also was wrecked on Miyako-jima; and a monument, raised on the spot by order of the Emperor William, commemorates the kindness with which the German mariners were rescued and then entertained for a whole month by the inhabitants. The name of the chief village is Karimata-Minato.

34. Ishigaki-jima.—As already stated, this island and the next, Iri-omote-jima, are together known under the collective designation of *Yayeyama*. Ishigaki, a very irregularly shaped island, might be defined as a clump from 6 to 7 miles in diameter, plus two narrow peninsulas, one 11 miles long running north-east, and another 4 miles long to the west. It has many hills and mountains, of which the highest is 1,680 feet high. The chief village, also called Ishigaki, stands on the south-

* This and some of the other names are differently spelt in the other chart.

† Probably a mutilation of the second half of the name (*kuni*), which signifies "country."

west coast. The south in general, which is comparatively level, is highly cultivated with sugar, indigo, and other crops.

35. IRI-OMOTE-JIMA, 15½ miles long by 12 wide, is very mountainous, some points close to the coast reaching a height of 1000 and even 1,300 feet, while the interior, for the most part covered with a dense growth of tangled forest, is still imperfectly explored. The chief village is called Sonai; but Iri-omote is less well peopled than its neighbours. The odious climate—with its constant downpours and violent alternations of temperature—and the rotting of timber in sluggish streams and morasses doubtless contribute to this result by producing dreadful malarial fevers, which the Luchuans call *fuchi*. The mountain recesses are for this reason viewed with well-founded dread, few that have spent a night in them escaping the scourge. The working of coal, which, though of poor quality, promised to become a profitable industry in Japanese hands, and was for a short time exported to Hongkong, has had to be practically abandoned in consequence of the alarming mortality among the miners. The difficult nature of the interior causes communication between the various villages to take place chiefly by boat along the coast. Horses, however, are also in constant use. Wild boars exist in great numbers, also pigeons, fowls, and pigs; and what with rice and fish of various kinds, the bill of fare in these Further Isles leaves even less to be desired than in Great Luchu.

Besides the large islands of Ishigaki-jima and Iri-omote-jima, the Yayeyama subgroup includes the islets of Taketomi-jima (*Roberton* of the chart), Kobama-jima (*Koubah* of the chart), Kuro-shima (*Raugh* of the chart, *Baugh* of the 'China Sea Directory'), Kami-banare-jima, or Kami-jima for short (*Inglefield* of the chart), Shimo-banare-jima or Shimo-jima (*Loney* of the chart), Haderuma-jima (*Sandy Island* or *Hasyokan* of the chart), which is the most southern of all the Luchus, and Hatoma-jima (*Isaac* of the chart). None of these islets attain to any height. All are inhabited.

36. Separate and westernmost of all the Luchu islands is YONAKUNI-JIMA (*Kumi* of the chart), 6 miles long by 2 broad, about 700 feet high, and well populated. The chief village is called Sonai (same name as that of the principal village on Iri-omote-jima). This island produces sandal-wood, mulberry, persimmon, and other valuable timber-trees. It is said that from here, on a clear night, lights are sometimes visible on the Formosan coast. Perhaps, however, only lights *off* the coast, such as those of fishing-boats that have come unusually far out from shore, are meant. None of the Further Isles have any decent harbours.

Such, in its widest extent, is the Luchuan Archipelago. The following is the official census of the various islands,* taken on December 31, 1891:—

* *I.e.* of such as are included in the Okinawa Prefecture.

	Divisions.	Number of houses.	Population.
Great Luchu.	Nafa and neighbourhood	9,872 ...	39,627
	Shuri	5,206 ...	25,880
	Shimajiri	18,825 ...	93,968
	Nakagami	21,633 ...	115,695
	Kunchan	15,189 ...	80,271
	Kume-jima	1,275 ...	5,453
	Miyako-jima	7,157 ...	34,926
	Yaeyama-jima and Yonakuni	3,320 ...	15,061
	Total	82,477 ...	410,881

NOTE.—Nafa proper contains 7,726 houses, with a population of 26,896.

STATISTICS OF CLASSES.

December 31, 1891.

Princes.		Nobility and gentry.		Common people.		Total.	
Householders.	Family.	Householders.	Family.	Householders.	Family.	Householders.	Family.
2	35	22,567	95,082	57,981	235,213	80,550	330,330

NOTE.—Besides these, there was one foundling not included in any class.

The large proportion of the nobility and gentry as compared with the lower classes forms a curious feature in these statistics; but there is, I believe, no doubt of the exactness of the calculation.

With regard to the geological formation of the various islands of the chain, it has already been stated incidentally that many are of volcanic origin—some, indeed, still active volcanoes belching forth smoke and producing sulphur. These may be regarded as outlying members of the Kyushu line of volcanoes in southern Japan. Tane-ga-shima is not of volcanic origin, and Yaku-no-shima not certainly so. Oshima is stated by Mr. Kada Tei-ichi, who examined its geology, to be composed chiefly of metamorphic rock; but in the smaller islets to the south of Oshima, volcanic agencies still display themselves sporadically. Great Luchu and its satellites show us a totally different formation—coral reefs everywhere on the seaboard, and coralline limestone together with metamorphic rocks. Marble is found in the neighbourhood of Untens. The Further Isles to the south-west are different again, the coral along the coasts being succeeded in the interior by granite and other rocks not yet determined, except so far as that some of them have been found to be of volcanic origin. Coal likewise, as already stated, occur in Iri-omote-jima—a thing utterly unknown in the northern members of the group. The coral reefs round the Further Isles, especially to the north of Miyako-jima, and again between Ishigaki and Iri-omote, are of great extent, and make navigation in those waters unusually perilous.

Turning now to the animal life of the archipelago, we find horses, cows, pigs, goats, dogs, and cats everywhere in a state of domestication,

and small wild boar and small wild deer on the principal islands. The cattle too are small, and the horses—or rather ponies—remarkably so, the majority being only from 10½ to 11 hands high, and some as little as 10 hands; but they are wiry and extraordinarily sure-footed. Two species of rats exist—the house rat and another smelling strongly of musk—and two or three species of bat, including the large fruit-bat, *Pteropus dasymallus*, which has been ascertained to be peculiar to these islands.* The mammal most conspicuous in Luchu by its absence is the monkey. This fact strikes one the more on account of the wide distribution of the monkey in Japan, where it ranges as far north as the extreme north of the main island, despite months of snow and ice. Luchu also has no foxes or badgers—a lucky deliverance in the opinion of Far-Eastern Asiatics, by whom these animals are universally credited with supernatural powers for evil.

Of birds some fifty species are known, including the *Erithacus komadori* (called *aka-hige* by the Japanese), ascertained by Mr. Pryer to be peculiar to these islands.† The reptilia include at least three species of frogs, one of which is a very large green tree-frog, and a salamander resembling the common Japanese species, except that it is yellow on the belly instead of red. A pretty green lacertula is common on Okinawa, as is also a chameleon. There are some harmless snakes, besides the poisonous Trimeresurus. The latter, called *habu* by the natives, is 4 or 5 feet long by 2 inches in diameter, and is an object of universal fear and hatred. In Okinawa, indeed, one rarely meets with it except in the forests of the north, and the islands of Kerama, Oki-no-Erabu-shima, and Kikai-ga-shima are said to be quite free of it; but in Oshima and Toku-no-shima it is ubiquitous. Not only does this dreaded reptile spring out at passers-by from the hedges, where its habits lead it to lie in wait for birds; it actually enters houses, making it perilous during the warm season to walk about the house at night except with a lantern. A letter from the Abbé Ferrié, dated June 1, 1893, informs

* The late Mr. Pryer, in the manuscript referred to on page 290, says, "Wallace, in his 'Island Life,' gives this bat as one of the animals peculiar to Japan; but it must be erased from the list, as it cannot be said to be found north of Luchu." (Mr. Wallace gives it as a native of Kyūshū, the southernmost of the large islands forming Japan proper.)

† He says, in the manuscript already quoted, "This bird was originally described from Japan upon specimens obtained by Von Siebold, who unfortunately transposed the native name, which should be *akahige*, giving this name to the *komadori*, and calling the *komadori akahigi*. . . . It is a ground bird, and its song very sweet. I have often seen specimens in the shops of Yokohama and Tokio, and, in answer to my inquiries, have been told that they came from Korea, which is very improbable, as a long price was always asked for them, and they are very susceptible to cold, and very unsuited to stand such an inclement climate as Korea. It is now definitely ascertained that they are natives of Luchu, where they are most probably residents, and do not extend further north, as Mr. Namie, of the Educational Museum, found them in March."

me that since my visit to him at the end of March five persons had already been bitten that season, of whom three had died. No antidote is known. The general result of such cases as do not end in death is lifelong crippling. Pecuniary rewards are offered by the authorities for the bodies of these snakes, dead or alive, and the villagers go out into the woods to secure them. Even so the number of the *habu* does not seem to diminish perceptibly, and there is at least one case within recent years of a village having been abandoned by its inhabitants because they could not cope with their dire reptilian foes. The species has been named *Trimeresurus ryukyuanus* by Mr. Pryer, and is, I believe, peculiar to the Luchuan archipelago. Several of the Luchu islands also produce sea-snakes, locally known as *Erabu-unagi*, lit. "Erabu eels," and which, though all lumped together by the natives, really belong to at least three distinct species. Most are harmless, but of one species the bite is poisonous. Of the commonest species the females are about 4 feet long and 9 or 10 inches round, the males about 2½ feet long; the females having a white belly and rings on the back, while the males have reddish bellies. A second and less common sort is somewhat larger, sometimes as much as 5 feet long; the belly reddish, with white, green, and black bands. All these can be easily caught in a depth of about 7 fathoms. The poisonous species is still larger, running to as much as 8 feet. Like vipers in some of the rural districts of Japan, these Luchuan sea-snakes are highly prized, being consumed as food by the rich, and in smaller quantities as medicine by the poor. They are smoked alive by being tied round and round a stick and placed at a suitable distance above a fire. They become nearly black in the process of smoking, and at first sight look like short black sticks to one viewing them in the Nafa market, where they are commonly exposed for sale.

Land-shells are abundant, and the waves cast up on the sea-beach a varied and beautiful assortment of marine shells. The coast waters swarm with fish, most of which, however, make but poor eating—at least, to one fresh from Japan.

The late Mr. Pryer, who visited Okinawa chiefly in quest of Lepidoptera, expresses disappointment at the results obtained, as all the specimens were either of world-wide distribution, or at least common in Japan or in Malaysia. He seems, however, to have examined only the butterflies, and even these but during a short visit in the month of May. The moths, I believe, have never been worked at all, though I was told of a monster bombyx peculiar to the furthermost isle of Yonakuni-jima. The paucity of insect life during my own visit early in the spring was remarkable. No mosquitoes had yet ventured out. Perhaps the open nature of the country in Southern Okinawa and the constant sea-breezes prove as adverse to insect life as they are beneficial to human beings.

* Unlike the fauna, the flora diverges very widely from that of Japan, over half the species being different. About thirty per cent. of the whole are subtropical species, recalling Formosa and the Fuchau province; about twenty per cent. are tropical, including waifs and strays from such distant regions as Australia. Several kinds of live oak and pine grow in the forests of the north of Great Luchu; but though these trees are also common in Japan, the species differ. Bamboos are much rarer than in Japan, and such as occur are chiefly of a different species—probably *Bambusa vulgaris*. A banyan (*Ficus retusa*) impresses a peculiarly Indian character on the scene, and the *Heritiera littoralis* and *Tournefortia argentea*, which attain large dimensions all along the coast, lend an equally southern aspect. One feature which at once strikes the eye, is the enormous quantity of cycads growing everywhere on the hills and in waste places. They are pressed into service as an article of food, on account of the sort of sago to be got from the tree's pith. The pandanus and a large cactus (called *bōra* by the natives) are used as hedges, the latter being planted on the walls round the houses. There are several palms, many ferns, and tree-ferns. The bird's-nest fern grows to a large size both on the ground and in the trees, and there are several kinds of orchids. The white lily (*Lilium longiflorum*) grows wild. A ginger with fine yellow flowers is common, as are agaves, both of the striped and plain forms, and an immense species of arum. Two species of banana grow on the islands, one (*Musa Chinensis*)—the edible species—being comparatively scarce, while the *Musa textilis*, which is used to weave cloth out of, is very abundant. Among other cultivated plants may be mentioned sugar-cane, which is the great island staple of commerce, sweet potatoes, tobacco, indigo of excellent quality, pumpkins and many others of the gourd family, Indian corn, beans, monster radishes, and various cereals. The marvellous industry of the inhabitants makes them lay out in rice-fields every tiniest nook of land capable of irrigation, even down to the very brink of the sea. Three rice-crops are generally harvested every two years, the plan being to let the ground lie fallow during the fourth half-yearly period. Of the sweet potato, as many as five crops are raised in two years. This invaluable plant, now the staple food of the people, was only introduced here from Southern China in the year 1605, for which reason it is called *Kara-mmu*, that is, "the Chinese potato." From Luchu it was carried north to the Japanese province of Satsuma, where it is accordingly known as the "Luchuan potato;" and thence it spread to Central and Eastern Japan, where the people call it *Satsuma-imo*, from a mistaken impression of its being indigenous

* Much of the information contained in this paragraph came to me from Mr. Y. Tashiro, who has compiled a catalogue of Luchu plants, but intends visiting the archipelago once more before publishing it. He was a pupil of the celebrated Professor Maximowicz.

to that province. Native historians inform us that it was acclimatized in Luchu and passed into common use within the short period of four years after its first introduction.

Meteorological observations are quite a recent institution in Luchu, having been started by the Japanese authorities at Nafa in the latter half of 1890, and being still confined to that single station. I insert an abstract of the statistics for 1891, the last published at the time of my visit. Statistics for a single year do not perhaps count for much, even if no doubt exists as to their accuracy, and the following table is given only for what it may be worth. It will be seen that the maximum in August is 33° 7′ Centigrade (92·66° Fahr.); and the minimum in January, 7° 4′ Centigrade (45·32° Fahr.).

NAFA OBSERVATORY, 1891, LAT. 26° 13′ N., LONG. 127° 41′ E.

(*Centigrade and millimetres.*)

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Mean temperature	15·7	16·8	17·2	19·9	22·7	24·2	27·8	27·5	26·9	24·6	20·5	17·9	21·8
Mean maxima ...	19·6	19·8	20·2	23·5	26·3	27·4	31·7	31·4	30·4	29·0	24·0	21·5	25·4
Mean minima ...	12·2	14·0	14·3	16·6	19·9	21·9	24·9	24·7	24·1	21·1	17·5	15·9	18·9
Absolute maxima	25·1	25·8	25·3	27·9	29·4	31·4	33·0	33·7	32·7	30·6	28·8	26·1	33·7
Absolute minima	7·4	8·7	9·4	9·6	15·9	18·1	22·0	23·0	21·3	18·9	13·8	10·4	7·4
Total rainfall ...	35·2	169·3	195·6	516·1	454·8	113·7	217·3	421·8	280·9	31·0	98·5	64·3	2598·5
Number of rainy days...	15	21	21	17	24	16	16	16	26	9	16	17	214
Mean barometer (reduced to freezing-point)... ...	765·0	764·6	762·9	761·0	758·0	755·4	756·5	757·0	756·0	760·2	763·7	766·7	760·6
Mean direction of wind ...	N 39° E	N 29° E	N 42° E	N 73° E	S 48° E	S 46° E	S 17° E	S 43° E	S 56° E	N 45° E	N 49° E	N 51° E	N 41° E
Mean intensity of wind ...	42%	26%	47%	26%	33%	35%	61%	50%	37%	44%	78%	63%	43%

As in Eastern Asia generally, so here also, speaking broadly, the winter is the dry season, while the late spring and summer form the wettest season; but the distinction is less marked than on the mainland of China or even in Japan. Speaking broadly, too, the climate of Great Luchu is a pleasant and salubrious one notwithstanding its moistness, the insular character of the place softening down all extremes of heat and cold. During March, 1893, the daily variation of the thermometer at Nafa was singularly small, never more than 7° Fahr., sometimes barely 1°; and the differences from day to day were likewise slight, varying in a whole month only between 56° and 72°. Also there was almost always an invigorating breeze. Captain Basil Hall and Dr. McLeod, who were there in September and October, and Commodore Perry, who was there off and on during the summer, speak equally highly of the pleasant climate and air of this fortunate isle.

Some of the other members of the archipelago, as already mentioned incidentally, are less favoured in this respect, notably Oshima and Iriomote-jima, with their dampness prevalent throughout the year.

Things are so bad in Iri-omote in this respect as to have given rise to a local proverb to the effect that it rains *thirty-five days a month!* The deplorable unhealthiness of this island, an unhealthiness which partly extends to its eastern neighbour Ishigaki-jima, has been already dwelt on. January and February are the rainiest months in all the Further Isles; October, November, and December the driest and least unhealthy; June and July those in which malarial fever is most prevalent. All the Luchus suffer severely from those typhoons which, brewing in the neighbourhood of Formosa or the Philippines, sweep up with such destructive fury towards the south-eastern coast of Japan.

My rides about the southern half of Great Luchu were extremely pleasant. The openness of the country, which in many places allows the ocean to be seen on either side, with colours deliciously varying according to the depth of the water above the coral reefs; the fresh sea-breezes; the alternation of hill and dale; the marvellous cultivation; the picturesque blocks of coral, standing up like ruined castles scarcely distinguishable from the real ruined castles that bear witness to a former less settled state of society; the happy-looking groups of labourers in the fields, all diligent and all most courteous when addressed;—these things made up a scene which it would be hard to match for quiet charm.

It is a curious fact, which I do not remember to have seen anywhere noted, that in the Japanese archipelago the vegetation diminishes, instead of increasing, in rankness as one travels south. Ride about Yezo during the summer months, and the grasses and tall coarse weeds are higher than your head as you sit on horseback. Central Japan does not carry things to such an extreme, the grass on the hills in summer being rarely much taller than a man on foot. In Great Luchu everything is much lower still. There are no tall grasses, comparatively few bamboos, few thickets of any sort. The country is park-like; and the hills, too, being lower than those of Japan and comprising no volcanic cones, but being rather gentle slopes carpeted with turf, the general effect is something closely approaching to typical English scenery. The early naval visitors to Luchu all remarked this, and went into raptures over it. For my own part, while granting the tranquil and, so to say, civilized charm of the scenery of Luchu, I do not think that it will bear comparison for a moment with the grander, more soul-stirring beauty of Japan—Japan volcano-guarded, snow-crowned, and flower-strewn, where cones, as graceful as they are treacherous, alternate with rich smiling plains and rugged granite peaks never trodden but by the foot of the hardy hunter in pursuit of the antelope or the wild boar. Luchu has none of these strong contrasts. It is all dimpled and pretty and on a small scale; there is no excitement in it. When I had left Nafa and was steaming up the Gulf of Kagoshima, at whose entrance the magnificent cone called

the Fuji of Satsuma keeps guard, while another volcano smokes lazily ahead, I felt as if I had said good-bye to some pretty dairymaid, and were now re-entering the presence of an empress.

III. History and Racial Characteristics.

Luchuan historians, nothing daunted, carry back the annals of their country over a period of more than eighteen thousand years; but as the books containing this so-called ancient history are barely two centuries old, Chinese and Japanese writers still remain our earliest sources of information regarding the little archipelago. As soon as the obviously mythological period is left behind, all three sources agree pretty well together, though allowance must be made for the tendency of both Chinese and Japanese so to interpret ancient events as to justify their later claims to over-lordship. Even the Japanese investigators of the present day, though more or less scientifically trained in Western methods, have not succeeded in shaking themselves free from patriotic bias.

According, then, to the orthodox account, heaven, earth, and man were all originally in a state of chaos and confusion. At length, however, Luchu emerged, and through the beneficent activity of a god and goddess named respectively Shiniriku and Amamiku, the rocks and soil were formed, trees and herbs planted, and bounds set to the ocean, so that mankind, who had hitherto lurked in caves or forests and had herded with wild beasts, were able to come forth and multiply. This god and goddess had three sons and two daughters. The eldest son, Tinsunshi, that is literally, the "Heavenly Grandson," became the first king of Luchu; the second, called Anshi, became the first nobleman, his liege; while the third was the first husbandman. Thus these three celestial brothers originated the three classes of society. Of the two daughters, one is the patron goddess of all females of noble birth, the other of all peasant-women. At this time there were no books, for writing had not yet been invented. Days were counted only by observing the phases of the moon, and seasons determined by the budding and withering of the leaves. Rice even had hitherto been unknown, the people feeding on berries and the flesh of birds and beasts But Tinsunshi taught them both how to grow rice and how to cook it. He likewise divided the island into three parts, called Kunchan, Nakagami, and Shimajiri, and these three parts each into districts (*magiri*), which divisions have remained ever since unaltered. Moreover, he built the royal castle at Shuri. His dynasty lasted 17,800 years, coming to an end at last in the twelfth century of the Christian era, as we shall see later on.

The earliest foreign mention of Luchu (the historian does not state which of the islands he means) is contained in the Chinese annals of the year 605 of the Christian era, where we read of an attempt to find out

something about the land and its inhabitants, which failed through want of interpreters. But soon after, an interpreter having been obtained by courtesy of the Japanese, an embassy was despatched to demand peremptorily the submission of the king to the Chinese emperor. Such submission being refused, an army was next sent in 611, the king's castle was burnt, and many thousands of men and women were carried away captive. This Chinese account, as will be noticed, is both circumstantial and plausible, and is probably a true one of *some* attack on *some* island in the Eastern sea. But which island? That is the question. A thousand years later, when Luchuan history was first put into writing, when Great Luchu had risen into paramount importance, and the name "Luchu" had become more or less confined to it, people

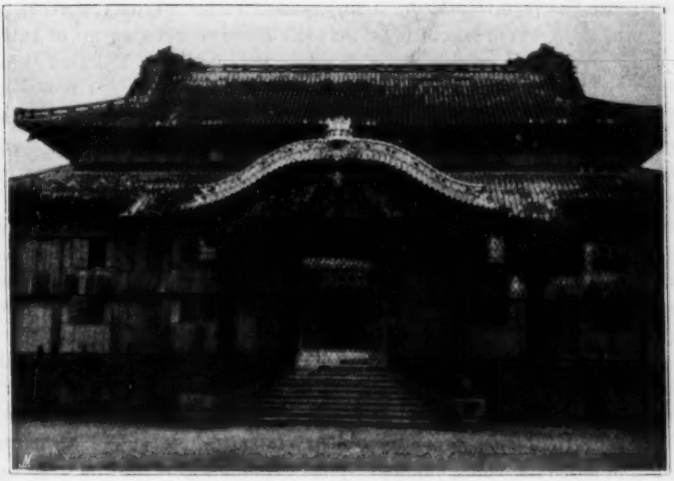


FIG. 1.—PALACE (SHURI).

seem to assume without further inquiry that Great Luchu was the place meant. In my opinion this assumption should not be so easily accepted without clear proof. Japan knew nothing of Great Luchu in the seventh century; yet we hear of the Japanese Court supplying interpreters. It is, therefore, at least possible that one of the northern islands, which were then called Luchu by the Japanese, was intended, or (if we give up the Japanese interpreter detail) that Formosa is intended; for a portion of that island, much nearer to China and far more likely to be attacked by the Chinese, was also anciently known to the latter under the name of Luchu. The former hypothesis does least violence to the text of the Chinese historian. Indeed, it does it no violence at all; but in the absence of further evidence, the question remains an

obscure one. In any case, be the incident of the Chinese raid on Luchu true or false, it led to nothing; for many centuries passed before intercourse—at least official intercourse, whether warlike or diplomatic—was renewed, though some slight mutual knowledge seems to have been slowly developed during the Middle Ages, thanks to a trade which gradually sprang up between Luchu and the Chinese of the neighbourhood of Foochow, as the junk sailors became bolder and ventured further afield.

Intercourse between Luchu and Japan followed an altogether different course. All through the early Japanese annals, from the seventh century onwards, we find scattered mentions of the little archipelago—first of the northernmost islands, and then gradually of those further south. Sometimes the precise name of the island is given, sometimes the term *Ryukyu* (Luchu) is used rather vaguely, leaving us in doubt as to which island is intended. The first opening up of intercourse, we are told, was in A.D. 617, when three men of Yaku-no-shima came with gifts to the Japanese empress Suiko. This was a few years after Japan had begun to civilize and centralize herself on Chinese models. The people of Tane-ga-shima followed suit in A.D. 678; and in the following year a Japanese envoy returned the visit, and conferred Japanese rank on the native chieftain, reaching home in 680 with a map of this "Luchuan Island," and an account of the wonderful biennial rice-crops for which it is still famous. Not only Yaku-no-shima and Tane-ga-shima, but Amami-Oshima, became fiefs of Japan by the beginning of the eighth century; and we hear of tribute from Kume-jima, which may vaguely mean any of the southern islands, a little later. No notice of Kikai-ga-shima appears till the year 1001, when we are told that there was war with "Western barbarians" (?), whom the Kikai officials received orders from the Japanese to repel. We also learn during the next century (about A.D. 1179) of Shimazu, Prince of Satsuma, being charged by the Mikado's government with the superintendence of Luchuan affairs—that is, the affairs of Tane-ga-shima, Yaku-no-shima, and Oshima. This, being interpreted, means that he had managed to obtain a hold on these islands for his own advantage, and, in order to legalize it, sought the Imperial sanction, which was then a purely nominal and ornamental thing. There also exist notices of a Japanese re-conquest of Oshima by warriors of the Taira clan after their expulsion from Japan proper at the end of the twelfth century.

And now we make a jump southwards across the long and stormy stretch of water separating Oshima from Great Luchu. The Japanese hero, Tametomo, a scion of the great house of Minamoto, descended from emperors, and famed for his personal prowess with the bow, having been exiled by his enemies of the rival Taira clan, passed down the northern members of the Luchuan group, conquering each island

as he went. Having encountered a great storm, his sailors were sorely affrighted. But Tametomo said, "Our fate is in the hands of Heaven; fear not for your lives!" wherefore the port at which they soon after landed was named *Un-ten*, that is, "fate heaven"—the Port Melville of our English charts. Tametomo was hospitably entertained by the local chieftain, whose sister made him father of a boy named Shunten; but as he was ever anxious to return home to Japan, he, with his Luchuan wife, twice essayed the voyage, being on each occasion driven back by dreadful tempests. The sailors suggested that the sea-gods disapproved of a woman being in the same ship with men. So Tame-

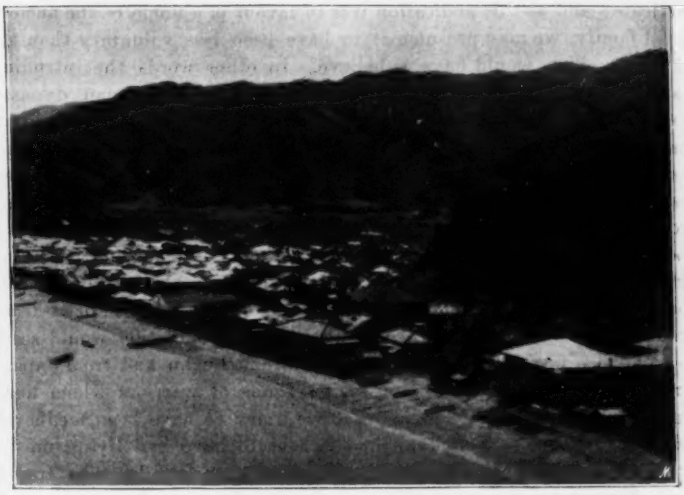


FIG. 2.—NASE, THE PORT OF OSHIMA.

tomo bade his wife remain behind and bring up their boy, whereupon he sailed back to Japan, and was seen no more in Great Luchu.

Shunten, the son of Tametomo and of his noble Luchuan wife, is represented as the Napoleon of Luchu. Seventeen thousand eight hundred years had elapsed since the time of Tinsunshi, son of the god Shiniriku and the goddess Amamiku, during which period twenty-five immensely long-lived monarchs had successively filled the throne. This very *ancien régime* had at last become effete; the government of the twenty-fifth king was as weak in effect as it was tyrannical in intention; rebellion, confusion, and usurpation were rife on every side. Shunten found himself compelled gradually to assume the direction of affairs if only to restore order—first as chief of Urazoe (which, by the way, is rather suspiciously far from Unten), afterwards of all Central Luchu, and lastly of the whole island (A.D. 1187), which he ruled in such

fashion that peace and prosperity prevailed. Among the other civilizing agencies which he introduced, the Japanese syllabary is specially mentioned. From him, according to the received account, the dynasty which has ever since claimed the throne of Luchu as its heritage is lineally descended, though I cannot make out from the history-books that this dynasty actually governed the island in undisputed and continuous succession. On the contrary, there seem to have been frequent troubles, sometimes accompanied by the election of a monarch from among the people. These troubles began already in the time of Shunten's grandson, —famines, pestilence, and other calamities showing clearly the wrath of the gods, and producing popular discontent which caused him to abdicate; and as this abdication was in favour of a noble of the ancient royal family, we may presume it to have been less voluntary than the native annalists would have us believe. In other words, the intruding Japanese kings were set aside, and the legitimate Luchuan dynasty was restored. But again, in the third generation, rebellion broke out, and the Luchuan realm, with which Oshima had been formally incorporated about A.D. 1270, was rent in pieces. This period, which is known as the Period of the Three Kingdoms, lasted from A.D. 1314 to 1429, from which latter time forward Luchu formed one realm, enlarged by the annexation of the Further Isles, whose loss of independence seems attributable to internal feuds among the various local chieftains. Till then the very existence of these islands had been unknown, or at least unheeded, by the Luchuans proper, though the population would seem to have been formed of waifs and strays from Luchu and from Japan. Graves are still pointed out on Ishigaki-jima of warriors whom local tradition represents as clad in what we know to have been mediæval Japanese costume. Yonakuni-jima is said to have had living on it, previous to its annexation by Luchu, seventeen families who traced their descent to the great but unfortunate Japanese Taira clan, and graves on several of the Further Isles have yielded finds of *magatama*, the comma-shaped ornament characteristic of proto-historic Japan.

Thus by the beginning of the fifteenth century the Luchuan kingdom had attained its widest extent, and ranked as an imperial power, at least in its own eyes. Governors were charged with the administration of each conquered island, Luchuan institutions and customs were established there, heavy tribute was levied, and the conquered were not allowed to resort to the metropolis, the only exception to this rule being that, if a Luchuan official had no other male heir than one born to him by a native woman during his term of service beyond seas, such child—but not its brothers and sisters, and never in any case the mother—might accompany him back to Luchu. Even under this restriction, several of the proudest Luchuan families are said to owe their origin to despised colonials. Nevertheless, discontents continued to arise both in the north and in the south; nor was the real

social and political unification of the whole archipelago under Luchuan rule established till about the year 1520, under King Shoshin.

Meantime foreign troubles were brewing. China, which under Kublai Khan had recently failed in an attempt to conquer Japan, determined to add at least Luchu to her empire. Accordingly, in A.D. 1372 an envoy was sent to demand the submission of the legitimate Luchuan king, which was granted—an example followed almost immediately by the two smaller rebel states, with the result that Chinese ideas, hitherto sparingly received, poured into the country wholesale. Noble Luchuan youths were sent to study in China, and numbers of Chinese families were transplanted to Luchu. To Chinese diplomatic pressure may perhaps be traced the reunion of the three Luchuan kingdoms under one head, the great king Sho Hasshi. This monarch's tolerance of Chinese dictation was rewarded by many favours, pecuniary and other, including the grant of the surname Sho (尚), *i.e.* "Venerable," which his royal line still bears. The castle of Omono-Gusuku, on an island in Nafa harbour, was set apart as a "concession" or "factory" for Chinese traders, just as the Japanese set Deshima apart at Nagasaki for the Dutch at a later date; and in the wake of trade, there followed a notable development of the resources of the archipelago. The building of temples, fortresses, and royal pleasure-houses, the coming and going of ambassadors with numerous retinues, negotiations regarding commercial facilities, voyages as far as Canton and even Malacca—such, together with an occasional rebellion in one or other of the smaller subject islands, are the matters which the native annals now record. The good offices of the Luchuan kings were sometimes even called in to negotiate between China and Japan—a somewhat perilous honour.

Meanwhile Japan had not been blind to the growing prosperity of Luchu, and more than one prominent Japanese clan had endeavoured to acquire a share in that monopoly of Luchuan trade which old custom and Imperial sanction had vested in the Prince of Satsuma. But the latter was determined not only to keep what he had, but to get more. The refusal of the Luchuan king to help in the Japanese conquest of Korea by Hideyoshi (A.D. 1592–8) was made the excuse for picking a quarrel. It smouldered for some years; but at last in 1609, Shimazu, Prince of Satsuma, sent his general, Kabayama Hisataka, with a hundred warships and over three thousand soldiers, who first subdued Oshima, Toku-no-Shima, and Erabu-shima, and then landed at Unten, as Tametomo had done four and a half centuries before. Great Luchu was conquered after a resistance of forty days, the palace sacked, and the king carried off to Kagoshima, where, however, he was treated with great respect—rather as an unwilling guest, to amuse whom all sorts of entertainments were provided, than as a prisoner of war. Thence he was conducted to Yedo to do homage to the Shogun, who treated him right royally, as did the Daimyos of all the provinces through

which he passed on his way back. But the interval of two years which thus elapsed was cunningly availed of by the Prince of Satsuma to reorganize the administration of the northern islands and to explore the southern ones by means of emissaries, who assessed the tribute there at rates which have lasted to our own day. The arrangement finally agreed on, after much talk and much judicious flattery of the captive monarch, was that Oshima and the other northern members of the archipelago should remain the exclusive property of Satsuma, but that the rest should be given back to the Luchuan king on condition of his paying a suitable yearly tribute and admitting at his court a Japanese political agent, who was to exercise supervision over the foreign affairs of the kingdom. This Japanese official or his subordinates, disguised in Luchuan dress, took part, unknown to the foreigners themselves, in all the interviews which, at a later period, the representatives of western nations had with the rulers of Luchu. Nevertheless, the payment of tribute to China was not vetoed, though all goings and comings between China and Luchu were jealously watched. We even find it recorded that in A.D. 1631 the Prince of Satsuma, happening to need money, caused a retainer of his, named Ijichi, to travel to Foochow with the Luchuan traders, disguised as one of them, and that, the profit thus earned having been very considerable, the practice was afterwards repeated every year.

By this time the Luchuan polity had crystallized into the form which it ever after continued to wear. Next to the king, who bore the title of *Usu-ganashī-mē*, came the *Oji* or royal kindred, the *Anzu*, and *Sanzukwan*,—these together forming the higher nobility entitled to wear gold hair-pins in their topknot. To them succeeded the *Wekata* (*Oyakata* in the Japanese pronunciation), wearing silver hair-pins ornamented with gold flowers, and ranking as a lesser nobility. The gentry, who were distinguished by the use of silver hair-pins, were divided into three classes, called *Pechin*, *Satunushi*, and *Chikudung*. The commoners, called *Nya*, wore hair-pins of brass. Hereditary titles and official rank were kept distinct, though, as was but natural, the nobility and gentry formed the governing class, the prime minister being always selected from among the king's near relatives. In some most important respects the country really deserved the title bestowed upon it by a Chinese emperor in 1579, and still proudly inscribed on the gate of its capital city, the title of "The Land of Propriety." There were no lethal weapons in Luchu, no feudal factions, few if any crimes of violence. Order was strictly preserved, and authority duly reverenced. Nominally severe (being based on Chinese precedent), the penal laws were mild in practice. Class and family considerations entered, however, largely into their execution. For instance, an assault on an elder relative was more heavily punished than one on a younger; and similarly when the rank of assaulter and assaulted differed. Not only were offences punished,

but conspicuous virtue and successful efforts for the public weal were rewarded. Confucius' ideal was carried out—a government purely civil, at once absolute and patriarchal, resting not on any armed force, but on the theory that subjects owe unqualified obedience to their rulers, the monarchy surrounded by a large cultured class of men of birth, and the whole supported by an industrious peasantry. Trade occupied a very subordinate place; indeed, it scarcely rose above barter.

To European eyes, accustomed as they are to seeing things done on a large scale, Luchuan political arrangements would doubtless have seemed to partake of an *opéra comique* character. The number of the nobles was out of all proportion large, and the list of public offices and officers fairly takes away one's breath. A Council of State, Departments Financial, Foreign, and Ceremonial, Emergency Departments, Boards of Agriculture, of Tribute, of Woods and Forests, Offices for the Control of the Royal Pantry and the Royal Stables, a Censor's Office, a Herald's Office, Offices for the Control of Tribute to China and Japan, an Office for Famine Prevention by the Planting of Cycads, an Office for the Control of the Manufacture of Tiles for the Roofs of Houses, Offices for the Control of Lacquer, of Vegetable Wax, of Sugar, in fact of every important article of export,—all these existed, and crowds of others, besides governors and subordinate officials of various minutely graded ranks for the outlying islands. In reading of it and thinking of the number of officials necessary for the manning of departments, boards, and offices so numerous, one almost begins to wonder whether there could have been any population left to govern. On the *contra* side, too, it must be remembered that the agricultural class had nothing of what we call liberty, and few rights save that to live and work for their superiors. Still, taking all in all, the land was prosperous, and the items mentioned by the annalists show that even progress, though slow, was real; for the general assertion may safely be hazarded that Oriental stagnation exists only in Occidental fancy. We read of new plants, new manufactures (*e.g.* that of porcelain from Japan), and new medical methods being introduced as time went on. Some slight knowledge was likewise gained of the existence of foreign countries other than China and Japan, by the visits of European vessels which began at the end of the eighteenth century. Father Gaubil, a French Jesuit resident in China, had translated and published in vol. xxiii. of the *Lettres Edifiantes* (A.D. 1781), a Chinese account of Great Luchu and its inhabitants; and soon afterwards British ships began to appear in these waters. The shipwreck of H.M.S. *Providence*, Captain Broughton, on the large reef to the north of Miyako-jima, and the kind treatment which the shipwrecked mariners experienced both on Miyako-jima itself and at Nafa, whither they managed to make their way, drew the attention of the British naval authorities to this remote corner of the world. Accordingly, at the conclusion of the Napoleonic wars, it was determined to fit

out an expedition to explore and roughly survey this and other little-known portions of the East Asiatic seaboard. H.M.S. *Lyra*, commanded by Captain Murray Maxwell, and H.M.S. *Alceste*, commanded by Captain Basil Hall, reached Nafa in September, 1816, and remained there and in the neighbourhood for six weeks. The British navigators established the most friendly personal relations with the natives, and worked away to right good purpose, not only in surveying and chart-making, but in questioning, observing, and investigating generally. Captain Basil Hall's account of this visit was the first European book on Luchu by an eye-witness of its customs. One of the British seamen having died, he was buried in a tomb supplied by the Luchuan Government at Amikudera, a shady spot on the seaside about two-thirds of a mile from Nafa. I was taken to see it, and found still legible the inscription in which the British commander recorded his sense of the favours received from "the king and inhabitants of this most hospitable island." By a curious irony of fate, the only part of the inscription no longer to be read is the name of the poor fellow whose memory it was intended to perpetuate. Since then, several other European seamen have been laid to rest in the same spot.

FIG. 3.—COMMON PEOPLE OF NAFA.

From that time forward the archipelago was visited occasionally by ships of various nations; for instance, in 1826 by Captain Beechey commanding H.M.S. *Blossom*, in 1844 by a French vessel which vainly endeavoured to open up a trade, and in 1845 by the British captain, Sir Edward Belcher, R.N., who surveyed some of the Further Isles. No diplomatic intercourse, however, was established, as the Luchuans, following their model China, always wished to avoid permanent relations with foreigners, though willing to treat with humanity and courtesy those whom accident brought as occasional visitors to their shores. They disapproved altogether of certain persons who came to stay.

These unwelcome guests were some French Catholic missionaries, of whom the earliest landed at Nafa in 1844, and a converted Anglo-German Jew named Bettelheim, who arrived as Protestant missionary in 1846. The Luchuans housed the foreign intruders, who persisted in remaining despite frequent entreaties to depart, but heeded their preaching so little that at last, after several years, both Catholics and Protestant, having convinced themselves of the uselessness of further persistence, left the island of their own accord. Meantime, far more redoubtable intruders than a few unprotected preachers of the gospel had arrived. One fine day in 1853 the American squadron under Commodore Perry, which was on its way to force open Japan, arrived at Nafa with the object of first forcing open Luchu. The weaker party of course went to the wall, the Americans established a coaling-station at Nafa, paraded the island, insisted on being received by the king, and terrified the inhabitants generally. The gain to knowledge was, however, considerable, and the *Journal* of the expedition is highly entertaining reading. Though a treaty was concluded, providing for the good treatment of American ships—a treaty which the French copied in 1855, and the Dutch in 1859—no permanent political result followed on Perry's expedition so far as Luchu was concerned, and the little island kingdom relapsed into its former seclusion. The interest of the place, to missionaries and diplomats alike, had centred in its position as a stepping-stone to Japan. With Japan itself open, all *raison d'être* for troubling about Luchu came to an end.

Leaving Luchu's relations with Europe and America, we must now go back a little to take up the more important thread of her relations with her nearer Asiatic neighbours. Politically speaking, Luchuan history for several centuries consisted in an attempt to sit on both sides of the fence, and from this attempt has arisen in our own day the so-called "Luchuan Question," which has caused many heart-burnings to Far-Eastern diplomats. With China on the one hand and Japan on the other, the kinglet of Luchu was driven into being a sort of Mr. Facing-Both-Ways; and the whole nation more or less, or at any rate the higher official class, came to have a double set of manners—one for use *vis-à-vis* the first of its inconveniently big neighbours, the other *vis-à-vis* the second. Thus the Japanese copper "cash," with which of late some of the commercial transactions of life had been carried on in the absence of any native money,* were always carefully kept out of sight when the Chinese officials were by to see. On the other hand, the Chinese year-names commonly current in Luchu were ignored as far as possible in diplomatic intercourse with Japan. Even in matters of food, the poor little Luchuans tried to make themselves all things to all men. It is, however, easy to see that of the two patrons China was

* The Luchuan Government more than once moved for the establishment of a native coinage, but the Japanese would not consent to this.

their favourite, notwithstanding the fact that Japan was more nearly allied by race. Their system of government, as has already been noticed, followed the Chinese civil, not the Japanese military type; and they always, among themselves, employed the Chinese calendar, which to Far-Easterns is a matter of the deepest import. Humiliating memories of the Japanese conquest in 1609, and the unwelcome presence since then of Japanese political agents doubtless contributed to this result. The Chinese over-lordship, on the other hand, was rather nominal than real, and the so-called tribute-ships despatched annually to Fuchau did such good strokes of business under the rose, that the Luchuans actually requested to be allowed to send *more* tribute to China than the amount originally stipulated!

Thus, for over two centuries and a half, did Luchu continue to own a double allegiance—an arrangement which, in the then state of things, with scanty communication and hazy notions of international law, worked fairly to the satisfaction of all three parties concerned. A sudden change was brought about by the opening of Japan in 1853. Japan, forced by the Western powers from her long seclusion, adopted, with singularly clever foresight, the Darwinian tactics of "protection by mimicry." She herself became a Western power, or at any rate an excellent imitation of one; and, as we all know, one of the ways in which Western powers display their superior civilization is by annexing territory and tolerating nothing but complete, undivided submission on the part of the annexed. Accordingly, in 1872, the Luchuan ambassadors who had come to congratulate the Mikado on his resumption of the functions of government, found changes more far-reaching than they had expected. They were informed that Luchu should henceforth be cared for by the Japanese Foreign Office, and that the Luchuan king was to account himself a member of the Japanese nobility. When, a few months later, it was further announced that the Imperial Government took over the responsibility of the treaties previously concluded by Luchu with the United States, France, and Holland; when, in 1874, Luchu was placed under the control of the Japanese *Home* Office; when finally, in addition to these more or less sentimental grievances, the Luchuans learnt that an edict issued at Tokio strictly forbade their sending any more tribute ships—in other words, trading-ships—to Fuchau, it is no matter for surprise that the little court of Shuri was thrown into paroxysms of fear and impotent rage. A new embassy, which had taken up its residence at Tokio in 1873, exhausted itself in efforts to obtain Japanese sanction to the double suzerainty theretofore existing. Japan, so they pleaded, was their father, but China was their mother; and how could so tender an infant as Luchu survive without the fostering care of both parents? I believe that they even endeavoured to persuade the representatives of some of the foreign powers resident in Tokio to take up their cause. But *De minimis non curat diplomatia;* Luchu was too insignificant to be

worth listening to. The end of it all was that the ex-king was brought as a guest, or in other words a state prisoner, to Tokio, where he still resides at the *Ryukyu Yashiki*, or "Luchu Mansion," no longer as a majesty or royal highness, but as a Japanese duke. His former domains have been annexed to the Japanese empire—annexed politically, and also partially assimilated bureaucratically under the name of the Prefecture of Okinawa, which is administered by Japanese officials, the provisions of Japanese law being carried out subject to various prudent exceptions which local needs and the circumstances attending a state of transition dictate. For instance, the Luchuans are exempted from the conscription. They are also exempted from the franchise, which should perhaps be to them a still livelier cause for gratitude, seeing the discord which that gift has fomented in Japan proper. Be this as it may, one thing is certain—no other nation to whom the Luchuans could possibly be subject would have granted the franchise to them, and equally certain that they would never have granted it to themselves.

Taking all things into consideration, more especially the gentle, yielding disposition of the islanders, it is probable that a few generations will suffice to obliterate all salient distinction between annexers and annexed. For my own part, and without pretending to any skill in political science, I view such a consummation as most desirable. Not that I would adopt that shallow argument for annexation which is reiterated as commonly in Japan as it is in Europe—the argument based on kinship of race and language. According to such a method of reasoning, England ought to be annexed to the United States, which (as the geometers say) is absurd. Indeed, does not all history teach us—to say nothing of private experience—that the bitterest quarrels are those between people of the same kith and kin? and is not the chief advantage of a common language the facility which it affords for wounding and exasperating each other's feelings? Nationality consists in the possession of a common past, and the desire for a common future. It is, therefore, not on any such *doctrinaire* grounds as that of racial and linguistic kinship that the hope to see Luchu form an integral and contented part of the Japanese empire can be founded. This hope is founded simply on the gradual recognition of expediency on the part of the islanders. At present there is still a conservative or nationalist party, which looks back fondly to the old days of independence. I believe, however, that, as its members die off, they will not be replaced by younger ones holding the same views, but that, on the contrary, all classes in Luchu will realize for their future guidance a fact which the Luchuan rulers themselves constantly harped on in their dealings with foreign powers—the helplessness and insignificance of their country. Luchu is very small and very weak. In these days of ubiquitous men-of-war, it is impossible for a very small and weak state to continue independent. The sole choice lies between masters. Now, Japan is surely a better mistress than China,

and must be a more sympathetic one than any European power could possibly be. She gives roads, schools, a convenient currency, sure protection to life and property. The aspect of the streets of Nafa to-day, compared with Mr. Gubbins's description written but thirteen years ago,* shows that Japanese influence has greatly increased trade—the very point concerning which the Luchuans were most fearful. Japan enforces no religious or social crotchets, and permits no foreign commercial intercourse, so that the people of Luchu need fear neither any violent attempt to subvert their habits of life and thought, nor any unequal contest with a race stronger and craftier than themselves. On the other hand, such Luchuans as care to enter the lists, to learn Japanese and dress like the Japanese, may obtain official employment on equal terms with the Japanese, there being no prejudice of race or colour to relegate them permanently to a subordinate position. In short, from every point of view, frank acceptance of incorporation with Japan appears to be the method by which the Luchuans may best secure comfort and relative importance in the future.

To turn back a moment before quitting the subject of Luchuan history, it may be useful to remark that from the fourteenth century onwards, the Luchuan annals are evidently authentic. All before that—even the conquest by Tametomo—I hesitate to accept without better confirmation than seems to be forthcoming; but interesting evidence of genuineness of another kind comes before us in the general similarity of spirit that subsists between the Luchuan fabulous early history and that of Japan. The legend of the Creator and Creatress, and the immensely long divine dynasty that preceded the rule of purely human kings, have quite a Japanese ring.

My own conjectural restoration of the illegible pages of the early history of this remote region would be somewhat to the following effect:—that the common ancestors of the present Japanese and Luchuan nations entered Japan from the south-west, crossing the Korean Channel with the island of Tsushima as a stepping-stone, and landing in Kyushu, the southernmost great island of Japan. This is rendered probable alike by geography, by the trend of legend, and by the grammatical affinities connecting Japanese and Luchuan with Korean and Mongol. We know from history and from the testimony of place-names† that this race gradually spread eastward and northward, apparently amalgamating with some comparatively civilized native

* See an excellent paper, entitled "Notes Regarding the Principality of Luchu," by J. H. Gubbins, of H.B.M. Legation, Tokio, printed in the *Journal of the Society of Arts*, June 3, 1881.

† See a monograph by the present writer on "The Language, Mythology, and Geographical Nomenclature of Japan viewed in the Light of Aino Studies," published as No. I. of the *Memoirs* of the Literature College of the Imperial University of Japan, Tokio, 1887.

tribes as to whose affinities nothing can now be ascertained, but driving before it and killing off an earlier savage race, of whom the modern Ainos are the last remnant. A glance at a map will show why, as Kyushu filled up, the bulk of the invaders pressed east and north:—there was most land in that direction. There was also, however, some little land to the south, namely, the Luchu Islands, dotted like stepping-stones, visible one from the other, the whole way from the Gulf of Kagoshima to Great Luchu. The extremely close relationship subsisting between the Japanese and Luchuans, both as regards language and as regards racial type, forces one to the conclusion that a fraction of the intruding race took the southern route, perhaps from choice, more probably as a refuge from defeat in internecine strife. I should imagine further that there was not originally any thought of the subjection of the Luchuan archipelago as a whole to the Japanese empire, the very idea of such extended units being impossible before the days of centralization, and there being no trace of such a claim in the official Japanese annals when interpreted in their obvious sense; that wave succeeded wave at varying intervals, each successive wave of southward-bound emigrants subduing and partly incorporating those that had preceded it, because the men from the larger and more turbulent land to the north, where resources and all the elements of civilization were more abundant, would naturally overcome the weak, isolated islanders; that the legendary conquest by Tametomo preserves for us under a single name the vague native recollections of many such occurrences in the distant past; and that the historical conquest of part of the group by the Prince of Satsuma in the seventeenth century, and the recent formal annexation of the whole archipelago by the Imperial Japanese Government, show us the *modus operandi* of this southward movement under modern conditions, when improved communication and greater political power facilitate action on a larger scale. We thus see, too, why it is difficult to define Luchu exactly: the reason is that the degree of "Japonization" of the archipelago has varied from time to time, and that if we are to take language and customs as our guides, it is by no means easy to say in each case whether similarity between Luchu and Japan arises from original identity or from borrowing, or whether, on the other hand, differences should be ascribed to original unlikeness, or to the fact of one or other country having preserved intact features of the common past which the other has let drop.

Whether the predecessors of the Japano-Luchuan race in Luchu were Ainos or not, it is impossible to say. Two place-names have been adduced by a Japanese savant, Mr. Kada Tei-ichi, in support of such a theory; but that seems very little to build on.* Far more important

* The names are *Sonai* and *Hinai* on the far-distant island of Yonakuni. *Nai*, which means "stream" in Aino, enters into the formation of numerous place-names in

is the discovery by Dr. Doederlein in Oshima of numerous hairy individuals among the smooth general mass of the population. I noticed none such myself, even among the fishermen. But Dr. Doederlein expressly says that he saw many quite as hirsute on the body and limbs as the hairiest Europeans; and his stay on that island having been longer than mine, and at a time of year (August) when a greater proportion of the labouring men would go naked, he is probably correct. Should the fact be really established, it would lend some countenance to the idea that a little Aino blood may yet survive in this outlying place, for we know of no intermixture with Europeans that might have produced a like result.

FIG. 4.—A LUCHUAN GENTLEMAN.

With these sporadic exceptions, the physical type of the Luchuans resembles that of the Japanese almost to identity, as is universally admitted by the Japanese themselves, who ought surely to possess a keener eye for minor differences between Mongolian and Mongolian than any foreigner can hope to have, and who do possess, as a matter of fact, a very keen eye indeed for detecting the inferiority of other Asiatics to themselves. Myself and my highly intelligent Japanese travelling companion were impressed in the same way, and I would venture to suggest that the peculiarities noticed by Dr. Guillemard * arose principally from differences of dress, coiffure, and shaving.

The Japanese type having been described once for all in Dr. E. Baelz's admirable monograph, entitled "Die Körperlichen Eigenschaften der Japaner," printed in Parts 28 and 32 of the *Mittheilungen der Deutschen Gesellschaft für Natur- und Völkerkunde Ostasiens*, nothing more need be said about it here. The most prominent race-characteristic of the Luchuans is not a physical, but a moral one. It is their gentleness

Yezo, where the Ainos still flourish, and also in northern Japan, whence they were driven less than a thousand years age. There is also a *Sonai* on Iri-omote-jima.

* See p. 27 of his delightful 'Cruise of the Marchesa.'

of spirit and manner, their yielding and submissive disposition, their hospitality and kindness, their aversion to violence and crime. Every visitor has come away with the same favourable impression—Captain Broughton, whom they treated so hospitably on the occasion of his shipwreck in 1797; Captain Basil Hall, Dr. McLeod, Dr. Guillemard—even the missionaries, poor as was their success, and all the Japanese. For myself, I met with nothing but kindness from high and low alike. The solitary exception to this chorus of praise is Commodore Perry; but then the account he himself gives of his haughty and masterful conduct, of his violent threats, and contemptuous disregard of all international law and courtesy, renders it scant matter for surprise that even Luchuan patience should have been exhausted, and that the islanders should have resorted to deceit, which is the only weapon the weak have at their disposal against the strong. The blustering Commodore's virtuous indignation at the employment of this weapon against no less august a personage than himself, makes most amusing reading by reason of its unconscious satire.

Though the Luchuans do not impress one as a vigorous race, I noticed no cripples among them, nor yet any blind people. The only deformity that seemed somewhat common was hare-lip. Obesity was extremely rare.

(*To be continued.*)

The map of the Luchu Islands is a reduction from Japanese Admiralty Chart. The names have been translated from the Japanese by Mr. Basil Hall Chamberlain.

A JOURNEY TO TAFILET.*

By WALTER B. HARRIS.

On Wednesday, November 1, 1893, I left Morocco City with a small band of Moors, myself in native clothing, although my identity was known to the five men who accompanied me. We camped for the night about 4 miles from the city, to the south-east, at one of the small "nzalas," merely a few thatch huts enclosed in a "zareba" of thorn hedge, which give security from horse-stealers, etc., at night. These "nzalas" are erected at intervals all along the roads of Morocco, or rather the tracks, for roads, properly speaking, do not exist. The natives in charge are responsible for any theft that may take place, and in return for this responsibility are permitted by the native government to levy a small tax on any who may use the "zareba."

The following morning, November 2, we were off before daylight, our road proceeding in an east by south direction over the plain of Misfiwa, one of the large Bashaliks of Southern Morocco. During the morning two rivers were forded, the Wad Urika and the Wad el-Melha

* Paper read at the Royal Geographical Society, Monday, December 10, 1894. Map, p. 408.

(salt river). Both rise in the Atlas mountains, the former issuing from the large valley of Akhliz, the second more to the east. The water of both is largely used for irrigating the plain, although the Wad el Melha is brackish. Some 10 miles north of the foothills of the Atlas they unite, in the province of Uidan, and, after running together some way as one river, flow into the Tensift near the Zaouia of Sidi Abdullah ben Sessi.

Some 15 miles from the city our road entered the Atlas mountains, at a spot where the large Wad Misfiwa emerges to the plains. The Berber name for the locality—for the inhabitants are one and all Berbers here—is Imin-zat, Imin being the Shelha word for mouth, corresponding to the Arabic "fûm," used so commonly for the same purpose, *i.e.* the opening of a valley on to the level. Here a decided change takes place in the formation of the dwellings of the natives, for instead of the "ghiem," or tents, and "nuail," or thatch huts, houses built of "tabia," native cement without lime, are found—a vastly superior type of dwelling, and peculiar to the Berbers in this part of the country.

Crossing the Wad Misfiwa by a difficult and rocky ford at Imin-zat, we turned more to the south, and, continuing along the east bank of the river for some 3 miles, we camped for the night at a miserable "nzala," where dirt and squalor reigned supreme. The valley of the Wad Misfiwa is at this part well cultivated, the land on both banks being neatly terraced for some distance up the hillsides. Grain, grapes, and olives seem to be the chief products, but almond and walnut trees are also plentiful. Near above the village is a large "sôk," or country market, held every Thursday, and thus known as "sôk el khamis." Above this spot the road takes an easterly direction, leaving the valley and ascending the buttress of the mountains between the valleys of the rivers Misfiwa and the Ghadat. This slope of the Atlas takes the form of a small plateau, with an average elevation of 3000 feet above the sea-level. The district is known as Tugána, and is under the jurisdiction of the Kaid of Misfiwa. But very few villages or habitations are to be seen, and the country is bare and desolate, being overgrown with brushwood. Continuing over the plateau for some 10 miles, we descended by an execrable path to the bed of the Wad Ghadat, near a ruined or uncompleted bridge. The river is swift, the bed boulder-strewn, and the passage, except at dry seasons, difficult, and often impossible.

During our passage on the plateau of Tugána we had to ford a small stream, the Wad Masin, whence a choice of roads lay before us, to the Glawi pass over the Atlas, namely, that we took, and another, steeper and less used, *viâ* Gadaruz and Tizi Aït Imicer. The latter is seldom followed except by men on foot, or by the small caravans of sturdy mountain mules. From the bridge on the Ghadat we pushed on to the large village of Zarkten, some 10 miles as the crow flies, but a march of some four hours, for the track zigzags in and out of the steep mountains, on the right bank of the river. The direction of the valley is north and south. At

all places it is narrow, shut in by high mountains covered with dense brushwood, the arbutus, laurustinus, evergreen oak, gum cistus, and a variety of pine being the most common, together with the "palmeto," or "azif." At places the river-bed is wide and stony, at others shut in by high walls of rock. The scenery is very fine during the entire way. Zarkten (elevation 3710 feet above the sea-level) is the residence of a deputy governor of the district of Glawa, and his residence forms the most important building in the place. It was the first example of a style of architecture which obtains amongst the Berbers of the southern slopes of the Atlas—a big square castle with high towers at every corner, gradually tapering toward their summits, and crowned with battlements. A garden of olive and walnut surrounds the castle, which is a large and imposing building.

Just above Zarkten the Wad Ghadat is joined by the Wad Tetsula, the latter continuing the general direction of the valley—*i.e.* north and south—while the Ghadat, rising in the snows of Jibel Glawi, or Tidili, flows down from the south-west. The Tetsula takes its name from a village higher up its course, but it is also known to the natives by the term Adrar n' Iri. At Zarkten is a "mellah" of native mountain Jews, whose tall stature and manly appearance compare very favourably with their co-religionists of the towns. Many carry arms, flint-lock guns as a rule.

Early on November 4 we left Zarkten, and after proceeding for a short distance up the valley of the Ghadat, ascended, by a rocky path to the south, a spur of the main chain of the Atlas. This district is called Ait Robaa, though, with the exception of a poor hamlet or two in the Ghadat valley, it seems to contain very few inhabitants. Five miles on the road descends steeply to the valley of the Tetsula, which river is at the village Agurgár ("walnuts"). The highest portion of the road between this ford and Zarkten is at a spot called Telettin Nuadil, where an elevation of 5600 feet above the sea-level is reached. We were now leaving wooded country and entering a district of bare rock and snow. Scarcely a blade of anything green was to be seen, the rocks and precipices presenting a forbidding surface of grey and black shales, and, higher up, beds of quartzite. Here and there, however, as at Agurgár, and further on at Ait Akherait, both on the right bank of the Asif Adrar n' Iri, or Tetsula, a few gardens, small and poor enough, enlivened the scene; but, with the exception of these and a few wind-torn evergreen oaks, little else was to be seen in the way of vegetation.

At a village, or rather a straggling house of loose boulders perched on a rock, and called Afúden Nugelud, we spent the night, finding shelter from the bitter cold in a dirty stable. It is close above this that the small village of Tetsula is situated, a little oasis amongst the rocks, for here the natives have scraped together a couple of acres or so of soil, and plant turnips, while a few walnut trees are also to be found.

At 10 a.m. on November 4 we reached the summit of the Atlas, at Tizi n' Glawi, 8150 feet above the sea-level. The stratum of quartzite overlying the shales extends here from peak to peak, forming, as it were, a wall between the mountains of Adrar n' Iri and Adrar n' Glawi, only a few yards wide, so that there is no pass, properly so called. Although we were at an elevation of over 8000 feet, the surrounding peaks appeared to be at least 3000 feet higher.

The pass of Glawa is the one most used by caravans proceeding to the Saharan regions of Draa and Tafilet, and there is a second road sometimes pursued, further to the east, *viâ* Demnat and Ait bu Gemmes, which leads out in the upper valley of the Dads river.

From the summit of the Tizi n' Glawi we descended some 2000 feet to the plain of Teluet, in which is situated the Kasba or castle of the Kaid of Glawa, the governor of the district. I had hoped from this spot to be able to pursue a road *viâ* Warzazat, where there are said to be some ruins, but, unfortunately, we found this impossible. A returning caravan, which had attempted it, but been obliged to retrace their steps, informed us that the tribes in that district were in revolt, and that the Kaid of Glawa had gone himself with troops to assert his authority. So we turned more to the east, and, carefully avoiding the governor's castle, forded the Wad Marghen, or Wad el Melha, as it is also called, some 2 or 3 miles further up. Crossing a watershed of some altitude, we descended some few miles further on to the valley of the Wad Unila, just above the large district of Tiúrassín. The Unila is a deep stream of fast clear water. Here it was for the first time that we saw the strange buildings in vogue amongst the Berbers of the south slopes of the Atlas, for, although the sheikh's house at Zarkten had given me some idea, the specimens here were far handsomer and larger, and as we approached the village, or rather collection of castles, the effect was very fine, their size and solidity being enhanced by the decorated towers at each corner of the houses.

The river Unila rises in the slopes of the peaked mountain of the same name, its source being a circular lake much venerated by the natives, and a place to which pilgrimages are annually paid. From all accounts, it seems that this lake occupies the crater of an extinct volcano.

The Wad Unila, after flowing through the districts of (1) Unila, (2) Assaka, (3) Tisgi, and (4) Ait Zaineb, flows into the Idermi, eventually joining the Wad Dads at Kheneg et-Tauria, and forming with it the Wad Draa.

The only European who had preceded me to Tiurassin was De Foucauld, Thomson's furthest in this direction being the kasba of the Kaid of Glawa at Teluet, whence he was turned back. From here my road diverged from that of De Foucauld, though meeting again a week's journey further on, between Dads and Ferkla. As far as it is known,

my road had never been previously travelled or described by any European.

At the village of Ait Ali-u-Yahia, in Tiurassin, we spent the night of November 5 at an altitude of 5480 feet above the sea-level.

Leaving the river-bed the next morning, our road ascended by a steep course of a dry torrent to an altitude of 6800 feet above the sea-level. The mountains hereabouts are covered with scrub and stunted trees, the predominant being the "arar" (calitris) and the evergreen oak. A magnificent view of the extended peaks of the Atlas was obtainable from this spot, the first panorama we had seen from the south side.

A ruined fort, Teherumt, is passed, and two small rivers forded, one of which is known as Igurian; the name of the second, only a small stream, I was unable to discover.

We spent the night of November 6 at Agurzga, a large collection of towered villages perched in a most romantic fashion on the pinnacles of high rocks. The little district is completely enclosed by precipices, through a narrow gorge in which the river of the same name find ingress into the valley from the main chain of the Atlas, and another through which it pursues its course to the plain, eventually to join with the Wad Ghresat, and empty their united stream into the Idermi. The elevation of Agurzga I found to be 4850 feet above the sea-level.

Early on the morning of November 7 I left Agurzga, and, crossing a stony watershed, descended a couple of hours later to the river-bed of the Wad Ghresat. The summit of the spur which forms the watershed is exactly 1000 feet above the level of Agurzga. The Wad Ghresat possesses all through the year a good supply of water, clear and fast flowing. A few gardens of almond and walnut trees line its banks, while maize and turnips seem to form the staple food of the people. The villages forming the district of the same name as the river are, one and all, situated on the left (east) bank, and consist of the usual square "ksor" with high towers. The inhabitants, like those of Agurzga, are of the Imerghan tribe of Berbers.

It was here we emerged from the mountains on to the wide plain which stretches between the Atlas and the Anti-Atlas, or Jibel Saghru. This plain, for the most part of gravel and stone-strewn sand, slopes gently to the south, and is crossed from north to south by the various rivers flowing from the main chain of the Atlas toward the Wad Draa, of which river it forms, in fact, the basin.

The whole aspect of the country changes at this spot, for the barren precipices of limestone are left behind, and the open country entered. However, the latter is almost as barren as the former, and, with the exception of a few stunted thorny acacias and clusters of wild thyme, no vegetation was to be seen. To the south the northern slopes of the Anti-Atlas were clearly visible, as barren in appearance as are the

southern slopes of the greater range. For almost 15 miles after leaving Ghresat one crosses desert, which, from its seven undulations, is called the "Sebaa Shaabat."

Near sunset we reached the large oasis of Askura (elevation 4200 feet above the sea-level). The oasis is split up into two portions, the westernmost situated upon the Wad Mdri, while the larger and eastern part is watered by two rivers, the Bu Jila ("a father of madness," so called from its floods) and the Wad Askura.

The inhabitants of Askura are Arabs, and with Tafilet are the only oases in this part of the Sahara inhabited by Arabs instead of Berbers. Although constantly attacked by the latter, their position in the centre of desert, and the fact that they are a hardy tribe and skilful horsemen, renders them safe from actual destruction. No more plundering thieves exist than these people of Askura, whose depredations on a passing caravan I myself witnessed.

The oasis contains many gardens, in fact it may be said to consist of gardens, one and all walled with "tabia" walls, over the tops of which the feathery heads of the thousands of palm-trees can be seen, and here and there apples, pears, pomegranates, and vines, and fine specimens of the *Tamarix senegalensis*. Although Arabs, the Berber style of building is in vogue, and many of the houses are excellent specimens of Southern Atlas architecture. The soil is extremely rich, and, owing to the excellent system of irrigation, large crops of grain, fruit, and dates are procured. The district is under the jurisdiction of the Kaid of Glawa, but his power over the turbulent people is little more than nominal.

It is in crossing the Wad Mdri that one notices for the first time a peculiarity that one is constantly coming across on the road to Tafilet—namely, the sunken river-beds, nearly all of which lie some 50 to 150 feet below the level of the plain. Usually a low range of hills skirts each bank of the river, about a mile to the east and west of its actual course, and there flat-topped hills, formed, no doubt, by water, form strange lines across the plain, running as they do at right angles to the Atlas and the Anti-Atlas, and connecting these two ranges.

The oasis of Askura is divided into four "kabylas," or tribes—(1) Kabyla el Ostia ("centre tribe," so called from its position); (2) Kabyla Mzuru; (3) Ulad Yakub; and (4) Ulad Magil. Each is governed by a Sheikh. It is impossible to give any tolerably correct estimate of the number of the inhabitants of the district, but the local boast that they can put twenty thousand armed men into the field, probably means that about eight to twelve thousand males, capable of carrying arms, are to be found there.

Just as 15 miles of desert divided Askura from Ghresat on the west, so do some 12 miles separate it from Imasín on the east. We did not stop at the district of Imasín, where are a few poor "ksor" inhabited

by Shereefs ("descendants of the Prophet"), but pushed on some 12 miles more until the valley of the Wad Dads was reached at Ait Yahia, and there we spent the night of November 8. Ait Yahia is a settlement of the powerful tribe of Seddrat, other divisions of which are to be found scattered about the surrounding country. It is here at Ait Yahia that the Wad Imguna flows into the Wad Dads, which further down its course, on its junction with the Wad Idermi, forms the Wad Draa. The Imguna flows from the Atlas, rising near the perpetually snow-covered peak of Trekeddit. At Ait Ahmed it leaves the mountains, and for some 20 miles of its course, until in fact it joins the Dads at Ait Yahia, its banks are inhabited by the powerful tribe of Imguna.

We spent the night of November 8 at Ait Yahia, at the village of Idu Tizi, at an elevation of 4700 feet above the sea-level.

Many natives visited our humble little tent, for a Dads Shereef, well known in the district, accompanied me; but as they spoke the Shelha language, and only one or two knew any Arabic at all, and that of the very slightest, I did not enter much into the conversation. My disguise was never for a moment suspected, for Europeans are unknown in these parts; nor would the natives look to find an "infidel" in the garb of the servant of a Shereef.

We had now approached quite close to Jibel Saghru, the Anti-Atlas, under the northern slopes of which this portion of the Wad Dads flows, for it is a few miles above Ait Yahia that the river abandons its southern course and turns more to the east.

The range of Jibel Saghru bears no resemblance to the main chain of the Atlas, which presents on its south side, as far as the eye can reach, an unbroken line of limestone peaks, tipped in snow, and varying very little in altitude. The Anti-Atlas, on the contrary, is volcanic in appearance, red, black, and purple in colour, and torn into all manner of strange forms and shapes. The only resemblance between the two ranges is their common sterility, for the slopes of neither—except in the actual valleys, and there only on the river-banks—bear any vegetation worth speaking of.

On November 9 we crossed a small plateau on the right bank of the Dads, and descended toward midday to the Zauia Ait bu Haddu, the village in which the Shereef whom I accompanied resided.

Dads certainly is the most important strategic position between Morocco City and Tafilet, for its powerful tribe inhabit both banks of the river of that name from where it emerges from the main chain of the Atlas to Ait Yahia, where, seeking a more westerly course, it flows almost immediately below the slopes of Jibel Saghru, the Anti-Atlas. Every caravan proceeding to and from Tafilet has to pass through the district, and it is therefore easy for the inhabitants to keep up an alliance with the surrounding tribes much to their own benefit, for they allow all caravans to pass their country in safety in return for equal

privileges elsewhere. Should a Dads caravan be plundered by any other tribe, woe betide the next batch of baggage animals that passes through their lands.

A word must be said as to safe-conducts amongst the Berbers. The two words in use are "zitat" and "mzareg," the latter of which means "a spear." This name is derived from the fact that in the old days it was the custom for a stranger passing through Berber tribes to be lent the spear of a member of the tribe in question, which, being recognized, rendered the bearer free from molestation. Spears have long ago disappeared, but often some well-known badge is carried in its place, and still more often a member of the tribe accompanies the stranger until the limits of their territory is reached.

The Jews exist in this part of the Sahara under much the same system, only in their case the name "debeha" ("sacrifice") is applied, from the fact that the protection of an influential Berber is obtained by the sacrificing by the Jew of a sheep or a goat. However, nowadays most of the Jewish families have hereditary protectors, the vassalage descending in both families from father to son. Any injury to the Jews is avenged by the Berber, as if it had been offered to a member of his own family. In return for these privileges, the Berber manages to squeeze a small amount of tribute out of his vassal. The Jews inhabit separate villages, but mix freely with the native inhabitants. Although despised, there seems to be little or no persecution, and the hard life led by Jew and Berber alike tends to make far finer men of them than are found in other parts of Morocco.

The tribe of Dads is divided into six "kabylas," or districts: to take them from the south—(1) Arbaa Miya ("the four hundred"); (2) Iutagin; (3) Ait u Allel; (4) Ait Hammu; (5) Ait Iunir; and lastly, Ait Tamuted. Of these the first named is the strongest and most powerful, possessing some forty strongly defended "ksor," or castles.

Unfortunately, space does not allow of my narrating many particulars of my stay of five days at Dads, where I resided as a native amongst the Berbers, and had many opportunities of examining their manners and customs. Suffice it to say, their domestic life is moral, simple, and peaceful. There seems far more fraternity amongst the people than amongst the Arabs. The women mix freely with the men, and do not cover their faces. The inhabitants are fair-skinned, with dark eyes and eyelashes. The men shave the entire face, except for a small pointed beard on the chin, and a fine line of short hair joining it on either side to the ear. Fierce in war, and brave to a degree, their home life is pleasant and cheerful, and many happy hours I spent wandering in the gardens by the river-banks, or talking of an evening over our supper. Nearly all the better class speak more or less Arabic.

The houses contain large high rooms, with scarcely any windows, the smoke of the fires passing out through apertures in the wall on the

ground floor, and in the upper storeys through holes in the flat roof. A "minzah," a room from which a view can be obtained, is erected on the roof, and forms the usual rendezvous of the men. Cleanliness is apparent everywhere, and the people are neat and tidy.

The women decorate, or rather disfigure, their faces with "henna," a red stain; and "kohl" (antimony) is largely used for prolonging the eyes, etc.

All along the cliffs that bound the river Dads large excavated caves are to be found, the historical origin of which is lost. A few are still inhabited by a portion of the tribe known still as Ait Iferi, the sons of the caves. Some of these caves are looked upon with particular reverence, and in one the Jews expose their dead for a night before burial.

The flat banks of the river extend from its actual bed to an average of from a quarter to half a mile east and west, where steep cliffs bring one to the level of the surrounding desert. The valley is interspersed with irrigating canals, which carry water to every part. Rain seldom falls, sometimes never in the course of the year, and upon the water-supply from the river the natives are dependent for their entire stock of food. Fed by the eternal snows of the Atlas, happily the stream never fails. Turnips, maize, and figs seem to be the staple food of the people. The latter are dried on the housetops, and stored for winter use. They are extremely hard and nasty. Meat is but seldom tasted, and fowls are scarce. There being no grazing land, cows are stall-fed, "fsa," a kind of lucerne, being grown for the purpose. The fifth day after my arrival at Dads, having proceeded the afternoon before some 20 miles up the river, we set out to cross the desert of Anbed, some 15 miles across. I had now only three men and a donkey with me, having left all my scanty baggage and my mule at the village I had stayed in at Dads. This was on account of the precarious state of the roads ahead of us, which abounded in robbers. It was detection that I feared more than robbery, though the latter might easily lead to the former, so I left everything behind and set out on foot.

Descending from the plain of Anbed, we reached the small and dreary settlement of Imiteghr, crossing the river of that name, which further on, joining the larger Wad Todghrá, takes the latter nomenclature. One "ksar" alone at Imiteghr seemed in tolerable repair, and even that was a poor-enough place. Its name was Ighir, and it is mentioned on De Foucauld's map. From Dads to Imiteghr, and again from beyond to Todghrá to Ferkla, my road was identical with the French explorer's, that is to say, for a distance of some 35 miles.

Leaving the route usually pursued by caravans and the natives, we turned more to the south, and, keeping parallel with the Wad Imiteghr, reached at sundown a small "zaouia" of shereefs of Mulai Brahim, who received us kindly and housed us in the mosque, where a supper of

boiled turnips was brought to us later on. I could not help thinking how disastrous would be the consequences if the fact that I was an "infidel" should be discovered while I was using the mosque, for even in civilized Tangier no Christian is allowed to enter them. Leaving before dawn on November 14, we entered a gorge in which the river flows, through which we passed for about a mile and a half. It is known as Imin Erkilim, the mouth of Hercules (?); but I was unable to discover any tradition why it was so called. One emerges close to the "ksor" of Ait bu Kanifen, celebrated cut-throats. A few hundred yards of plain and the oasis of Tiluin, or Ait Iluin, is reached, and under the luxuriant growth of palm trees we breakfasted.

Thence a couple of miles of desert brings one to the lower end of the oasis of Todghrá, situated on both banks of the river of that name. The palm groves could be traced for many miles, following the course of the river above us. On returning from Tafilet, we proceeded by another route at this part, following the course of the river as far as Taurirt, where we spent the night. This latter is the usual course pursued by the native caravans, etc. Palms, which are here so plentiful, as at Askura, are not to be found between the two districts; I saw none at Dads or elsewhere on the road, though as we proceeded eastward they became general, until the climax is reached in the unparalleled groves of Tafilet itself. The Wad Imiteghr joins the Todghrá at an elevation of 4250 feet above the sea-level. The rivers now flow east, the plain of Anbed forming the watershed between the basin of the Wad Gherís and the Wad Draa. The Todghrá eventually enters the former, and, after joining the Wad Ziz at Tafilet, is absorbed by the sandy desert near the marsh of Dayet ed-Daura.

Having crossed the Todghrá, we passed the solitary settlement of Tabibast, and entered the desert once more, and for some 16 miles travelled over a stony plain known as Seddat, our road running parallel with the Todghrá, which lay equi-distant between us and the Anti Atlas, a couple of miles perhaps from each.

Ferkla was reached at sunset, and tired and weary we were after some 40 miles' walk, when, in the very thick of the oasis, we put up for the night in the large fortified village of Asrir—almost a little town, with fine tall houses and tunnelled roads, as in the cities of Morocco proper. The large oasis of Ferkla is inhabited by portions of several of the large Berber tribes, namely, Ait Merghad, Ait Isdeg, Ait Yafalman, and the Arab tribe of Ahl Ferkla. There are also several "mellahs" of Jews. I found the elevation of Asrir to be 3260 feet above the sea-level.

We left Ferkla before dawn on November 15, and, crossing the winding river twice, emerged an hour later from the groves of palms. Ten miles from Ferkla the road, which from Ghresat to this spot had been almost due east and west, takes a sudden turn to the south,

entering by a gorge a valley of the Anti-Atlas, through which the Wad Todghrá flows to emerge again south of Ul Turug, near where its junction with the Gherís is situated.

A picturesque fortified village, on the summit of a high rock, completely dominates the valley, standing equidistant from the hills on either side, by name Igli; while a mile further on, where the road turns again for a time to the east, are situated the luxuriant palm groves and villages of Milaab. The road, having crossed the Todghrá again at this spot, bisects the palm groves, and the scene as we passed through was a charming one, the soil well cultivated with "fsa" and maize, while above waved the feathery heads of the palms. Water in tiny channels flows in every direction. The inhabitants belong to the Berber tribe of Ait Iazzer. This portion of the valley of the Todghrá is almost circular in form, the river leaving it at the south-east corner by a narrow gorge, while the road proceeds more directly east, and crosses a range of low, black, barren, stony hills. Descending from the summit of these, one reaches the northern end of the large oasis of Ul Turug, quite near the enormous "ksar," the largest walled village we saw anywhere in the Sahara. Space has not allowed of my describing any details of the other "Ksar" we had passed through, but the size and importance of Ul Turug justifies some few words.

The upper portion lies on the steep slopes of the eastern extremity of Jibel Saghru, known at this point as Jibel el Kebir, while the lower portion extends over the level. The entire "ksar" is surrounded by high walls of "tabia" of great thickness, above which appear the flat roofs of such houses—and they are many—as possess two stories. One gate alone gives entrance and exit, and this gate, as is the custom all through the country, is closed from sunset to dawn.

Within, on passing through the gate, one enters a great square, surrounded on two sides by high houses, and on the other two by the outer walls and towers of the fortifications. Streets branch off from this square to various parts of the "ksar." Under the walls on the south side an arcade runs for some distance, facing the square, and serving as a store and stable for passing caravans, where goods can be piled up away from sun or rain. In using the word "caravans," it must not be understood that merchandise is taken by this route to Tafilet to any extent. Such caravans as do travel consist merely of the small mules of the Berbers laden with dates, or returning with pig-iron, wheat, or sometimes manufactured goods. Ul Turug is the principal stronghold of the powerful Berber tribe of Ait Atta, whose territory extends from several oases to the north, throughout Jibel Saghru as far as the Wad Draa, the inhabitants of which acknowledge the suzerainty of the Attaui chiefs, and pay tribute in return for their guaranteeing their immunity from other plunderers.

Passing the night of November 15 at Ul Turug we left the following

morning as soon as the gate was opened. Issuing soon after sunrise from the palm groves, we entered upon 12 miles of dreary desert, called Maghra, on the edge of which we forded the Wad Todghrá, near where it flows into the Gheris. Our road now lay almost due south, parallel with the eastern front of Jibel Saghru.

An extraordinary example of the labour employed in carrying water from place to place is here visible, for the desert of Maghra is threaded by no less than eleven rows of subterranean aqueducts. These channels are formed in the following manner: Pits some 30 feet deep by 10 in diameter are sunk some 20 to 25 yards apart and joined by a tunnel, through which the water flows. A rough estimate gives the result that, in order to bring water from the Wad Todghrá to Tiluin, the next oasis, 11 miles distant, no less than some nine thousand of these pits must have been sunk, and the intervening spaces tunnelled—a vast and stupendous piece of labour.

The inhabitants of Tiluin are a branch of those of the same name inhabiting a small oasis near the eastern end of the Imin Erkilim, whom I have mentioned already. The principal home of the tribe of Ait Iluin is near the oasis of Gheris; they are a subdivision of the powerful tribe of Ait Merghad. Almost contiguous with Tiluin, and separated only by a narrow strip of desert, is the larger and more flourishing oasis of Fezna, a division of the tribe of Ait Yafalman. It is curious to note the extraordinary manner in which all the tribes and subdivisions of the tribes inhabit different parts of the country; but such must be the case in any land where warfare, conquest, and reconquest are as common as in this corner of the Sahara desert.

Again, only a strip of desert divides Fezna from Jerf, the next oasis. This large settlement of Berbers takes its name from a prominent cliff which juts out from Jibel Saghru into the plain terminating above the oasis. The buildings of Jerf are the usual "ksor," though from Ferkla on they had gradually been losing their highly decorated appearance, and becoming larger and stronger instead. So fertile are these large oases of palm that a much greater number of lives can be supported by the produce of the soil than is the case on the river-bed of Dads, for instance, and the result is apparent in the large population of the "ksor."

From Jerf the road, proceeding almost due south, leads one through a long string of small oases situated on the right (western) bank of the Wad Gherís. The first of these is Bauia, and a mile or two further on Kasba el-Hati, and but little further Ulad Hanabu.

Here we forded the large bed of the Wad Gherís, the waters of which are salt, and, ascending the east bank, spent the night at the large "ksor" of El Meharza, the capital of Se-Sifa, one of the provinces of Tafilet.

I had left Morocco City on November 1, and arrived in Tafilet on the evening of the 16th of the same month.

Tafilet, Tafilelt, or Tafilalet, as it is variously called, is said to derive its name from Filal, a district in Arabia, and to have obtained its present form from the addition of the Berber prefix Ta, or Ait, "the sons of." The final *t* is again a Berber addition, being no doubt the feminine termination. It is from the fact that the root of the name owes its origin to Arabia that one comes to the conclusion that before the Arab invasion it must have borne some other title, and one is naturally led to fall back upon Sijilmassa, the ruins of the city of which are still visible, and there is every probability that this was its original name.

The district of Tafilet may be said to consist of a long strip of irrigated land extending along the parallel beds of the Wad Ziz and Wad Gherís. Although two districts lying further to the north, Ertib (Reteb) and Medaghra, are often included in Tafilet, they seem in the eyes of the natives to form separate provinces, and as such I shall treat them, or rather ignore them, as my travels in the oasis did not take me as far north.

The Wad Gherís we had already seen, but the day after my arrival in Tafilet, proceeding from Meharza to Dar el-Baïda, on the east of the oasis, I crossed the Wad Ziz, the river from which the principal supply of water for irrigating purposes is drawn. The channel is deeply sunk between high banks of clay, sand, and alluvial soil, the actual stream at the time of my visit occupying perhaps one-third of the river-bed, and averaging from 60 to 100 feet in breadth at the ford where we crossed it. The water is clear and very fast-flowing.

Tafilet boasts seven provinces—

(1) On the north, Tizimi.
(2) On the west, Es-Sifa.
(3) On the south-west, Wad El-Melha.
(4) In the centre, Wad Ifli.
(5) On the south, Es-Sefalat.
(6) On the east, El-Ghorfa.
(7) On the north-east, Tanijiud.

To attempt correctly to estimate the extent of ground which these districts cover, and which is under cultivation, would be too hazardous to be of much value, for the oasis varies so much in width from place to place, according as the irrigating canals are taken far afield or not, that nothing short of a careful survey would give a satisfactory result. Again, it is equally impossible to state the southern limits of the oasis, for much of the land situated south of the junction of the Wad Ziz and Gherís is only capable of cultivation after exceedingly heavy rains in the Atlas mountains, where the rivers rise, in which case the natives of the Ait Atta tribe cultivate the banks as far as the Dayet ed-Daura. However, to make a rough estimate, it is probable that some 450 square miles are under palm cultivation.

To take the provinces in the order I have given :—

(1) *Tizimi*, Ait Izimi, is a large district extending along the west

bank of the Wad Tizimi, as the main channel of the Wad Ziz is called at this part. The inhabitants are Arabs of the Ahl Souba tribe, and are constantly at war with the Berbers of Medaghra and Ertib, whose country lies higher up the same river. The principal "ksor" are Kasba el-Barania, Kasba ben Ali, and Ksar bel Hassen.

Separating Tizimi from its two nearest neighbouring districts, Es-Sifa and Tanijiud, it is a strip of desert varying in width from 2 to 5 miles, through which the river flows, the only vegetation being a few oleanders and reeds on its banks.

(2) *Es-Sifa* forms the western province of this oasis. It lies between the Wad Gherís and the Wad Ziz, which are here some 5 miles apart, their courses being almost parallel. The land is, however, irrigated almost entirely from the Wad Ziz, on account of the saltness of the water of the Gherís. The country is poor, the gardens only half cultivated, and many of the garden walls entirely destroyed. El-Meharza is the capital of the province, situated high above the left (east) bank of the Wad Gherís.

(3) *Wad El-Melha*, the next province, lies directly to the south of Es-Sifa, and forms the south-wèstern corner of the oasis. As its name implies ("salt river"), it takes its title from the Wad Gherís, which flows through it. Taghranjiut, situated in Beled er-Riad ("garden-land"), is the principal "ksar."

(4) *Es-Sefalat* forms the southern province of Tafilet proper, its boundary on the west being the Wad Gherís, while on the east it extends some way across the Wad Ziz. This district possesses the largest "ksar" of Tafilet—Tabu Assamt (Ait abu Assamt); but, in spite of its size, it plays no important part in the trade or welfare of the oasis.

(5) *El-Ghorfa* is bounded on the east near the desert, and lies entirely on the eastern side of the Wad Ziz. Near its southern boundary is the Sebkhat Aamer, a large salt lake, the produce of which is a monopoly of the shereefs of Tafilet, relations of the present reigning sultan, for it is from this remote oasis of the Sahara desert that the ancestor of the present dynasty reigning in Morocco sprung.

(6) *Tanijiud* is the north-east province, and, like El-Ghorfa, is bounded on the east by the desert. Its water-supply is brought by camels from the Wad Ziz, diverging from the main stream at Iniyerdi, in Medaghra. The cutting off of this water-supply above by the Berbers is a constant incentive to warfare.

(7) The sole remaining province, *Wad Ifli*, is by far the most important, and on this account I have left it to the last, for, with the exception of Es-Sifa, a small part of Es-Sefalat and Tizimi, and a corner of Tanijiud, I did not travel in the other districts. As Wad Ifli is surrounded on all sides by the other provinces, it is far more immune from attack from without, and has thus become, though not the largest district, the centre of religion, learning, and more especially trade, in

the oasis. Here, too, is the tomb of Mulai Ali Shereef, the founder of the present dynasty, who came, a refugee from Yembo in Arabia, to Tafilet in 1620 A.D. The gardens of this province are in far better repair than elsewhere, and the irrigation-canals in excellent working order. The principal "ksor" are Abu Aam and Rissani; the former the seat of trade, the latter of the government, though to all intents and purposes there is none, beyond the tribal councils and the influential shereefs, who are appealed to in cases of dispute. Near these two "ksor," and about equidistant from each, is held the great weekly market of Tafilet, the arbaa of Mulai Ali Shereef. The market-place is an open square amongst the palm-groves. A peculiar appearance is added to the scene by the huts in which the natives sell their produce. Timber being a valuable import, these are built of mud-bricks and sand, and are in the shape of beehives, the domes on the summit being pointed. The shade is sufficient to keep such goods as sugar and candles from being spoiled by the sun's rays. The inhabitants of Tafilet are nearly entirely Arabs. The principal divisions or tribes are:—

(1) The Shereefian families.
(2) The Ahl Suba Arabs.
(3) Beni Mohammed.
(4) Tafilet Arabs.

Such Berbers as there are belong almost entirely to the tribe of Ait Atta, whose stronghold we had visited at Ul Turug.

Nearly all the manual labour is done by the Haratin—a word implying "free men," in contradiction to slaves—who come from the banks of the Wad Draa, and are largely impregnated with black blood, the negro type being shown in their heavy build and thick lips. A few words must be said as to the cultivation of the dates, which, with leather-work, forms the sole industry of Tafilet. The water for irrigating purposes is brought by many canals from the Wad Ziz to the palm groves. The soil under the trees is carefully dug, and divided by low raised banks into squares some 10 to 20 yards in extent. Into these, by removing a small part of the bank in which the water flows—for the canals are raised above the general level of the soil—a connection is formed with the canal and the land flooded, the water being allowed to proceed from square to square by removing portions of the dykes. The object of this irrigating of the patches separately is that there may be no waste, only the portion which actually requires water receiving it. These squares are cultivated with "fsa" (lucerne); some wheat and barley, where the shade of the palms is not excessive; and maize and turnips, the latter of which are not so common as in other parts of the desert, the dates taking their place as the staple article of food of the people. Not only, however, does the palm supply the human being with provision, but the coarser species of dates are employed for fodder, such cattle as there are and horses and donkeys

being fed almost entirely upon them. The finer kinds are exported to Fez and Morocco City by caravan, the empty pack-animals bringing in return wheat and European manufactures, and rough iron for weapons and agricultural purposes, etc. It is a curious fact that some 90 per cent. of the export of Tafilet dates from Morocco go to London, and some years, I believe, England has received the entire supply. The export trade is mostly carried on by the native merchants of Fez, and is, of course, by no means a large one.

The "ksor" of Tafilet are large and strongly fortified, one and all possessing only one gate, on entering which the stranger is scrutinized and often questioned by the "boab," or gatekeeper. It is in the district of Wad Ifli that the ruins of the city of Sijilmassa are situated, and in crossing the oasis from El-Meharza to Dar el-Baida, I took the opportunity of visiting them, for they lie almost upon the road. The place must at one time have been a very large city, though but little remains now but crumbling ruins, with a mosque and minaret in tolerable repair, and a half-ruined bridge over the Wad Ziz. "Tabia" seems to have been almost entirely used in the construction of the buildings, though there were here and there signs of stone ruins. In any case, any stone employed must have been brought from a long distance, probably from the slopes of Jibel Saghru to the west. Although the name of Sijilmassa is still remembered and used, the commoner term for the ruins is "Medinat el-Aamra." Situated on the very banks of the Wad Ziz, the bed of the river is so low that it would be no easy task to carry the water up for the supply of the town, so a canal was made connecting the river much higher up with the town, and it speaks well for the workmanship to say that the water is still flowing fast and clear between its well-formed banks. Several small bridges, also to-day in good repair, cross this canal. The date of the founding of Sijilmassa is difficult to gather, for, probably long before the town was built, there was a Berber colony there; but the period of its destruction is better known, and was shortly before the end of the last century, when, after years of internal strife and jealousy amongst the native princes, it was sacked by one more successful than the rest. It is still much reverenced, however, and on the Eid el-Kebir, and Eid es-Soreir, the two great feasts of the Moslem year, a large concourse of people gather together to pray at the "msala" near the mosque.

A word or two must be said, in conclusion, with regard to the caravan road from Fez, the most direct and most commonly travelled route to Tafilet—that is to say, by natives, of course, for, as far as is known, only two travellers had reached the oasis previous to my visit, René Caillié in 1828, and Gerhard Rohlfs in 1862. Eleven days is the time usually occupied by caravans in accomplishing the journey from Fez. The stoppages are usually as follows: (1) From Fez to Sufru, a small town some 16 miles south of the capital; (2) Tagharzut, in the Beni

Mgild country; (3) Njil, in Ait Yussi; (4) El-Kasabi, after which the Atlas are crossed at Tizi Telrempt, on the east of Jibel Ayashi, whence the basin of the Wad Guir and Wad Ziz is reached; the (5) station being a "nzala" near the junction of these two rivers; thence (6) to Gers, and from Gers Tafilet is reached in four or five days, generally early on the fifth, the caravans stopping at any of the "ksor" they choose in the valley of the Wad Ziz, for the road for this latter part of the journey runs parallel with the river. I spent nine days at Tafilet, in the camp of the sultan, where I made my identity known, having succeeded in pushing so far without my disguise being discovered.

Returning by almost the same route, only two or three slight variations were made in my road. At Todghrá I verged to the north and spent a night at Taurirt, instead of proceeding *viá* Imin Erkilim and Ait Mulai Brahim, and, after crossing the Wad Marghen at Teluet, we turned to the west and spent a night at the great stone castle, or Kasba, of the Kaid of Glawa, an extraordinary fortified building of stone, situated at an altitude of 6900 feet above the sea-level. It was here that Mr. Joseph Thomson had unfortunately been turned back by the governor on his attempt to push through the Atlas mountains in 1891. On reaching the ruined bridge at Tugána, I continued down the river course, and spent a night at the zaouia of Sidi Behal. Although it was raining fast the descent from the Atlas to a warm climate was most pleasant, for ever since my arrival in Tafilet there had not been a night in which the frost was not extreme, and once or twice the puddles on the road never thawed at all during the day, though the sun was usually hot. I reached Morocco City towards the middle of December, and was once again in Tangier on January 9.

Want of space has forced me much to curtail the notes of my journey and to give only its outline here, but I trust before long to be able to make public the details of my entire journey, together with the sketches and photographs I was able to obtain.

Before the reading of the paper, the PRESIDENT said: We are favoured this evening by the presence of Mr. Walter Harris, known to many of us from two or three interesting papers already communicated to us for our *Journal*, who made a very adventurous journey last year across the Atlas mountains as far as the oasis of Tafilet. He has gone over a country most of which had not been traversed before by any European, and as he is not only an intrepid traveller, but a good artist, he will be able to add to his description by some interesting illustrations. I now call upon Mr. Harris to have the kindness to read his paper to us.

After the reading of the paper, the following discussion took place:—

The PRESIDENT: I don't think there are many people present who can discuss Mr. Harris's paper from personal knowledge, and I am sorry to see that the only Fellow of this Society, upon whom I had my eye and who has some knowledge of Morocco, has just left the room, Sir Francis de Winton. In the meanwhile, if any one present has any remarks to make on Mr. Harris's paper I shall be very glad.

Admiral Sir ERASMUS OMMANNEY: My experience of Morocco is confined to

the coasts. Often from Gibraltar I have looked upon the Atlas mountains and longed to know a great deal more about them, and have never yet heard so much about them as during this evening. I think we are very much indebted to our friend, Mr. Harris, who is the first to bring to the Royal Geographical Society such a large knowledge of this country and its inhabitants. The question of Morocco is one for the future, as we know that the fanaticism of the Mohammedans has hitherto prevented any sort of innovation or improvement. I know that the lecturer will agree with me that the country has wonderful tracts of land that, if properly fertilized and cultivated, might become the granaries of Europe almost. I hope that Morocco, which at the present time is only a port of Africa, will not fall to be divided by Europe, but that some enlightenment will arise which will tend to the development of so valuable a portion of the world so closely connected with Europe. I cannot sufficiently express my gratitude to the lecturer this evening for the information he has given on this part of Morocco.

The PRESIDENT: Mr. Harris's paper, I feel sure, has given an immense amount of pleasure and interest to the meeting. I think, as far as I can make out, that he is the first Englishman who has crossed the Atlas mountains. In the first volume of the Society's *Journal* we had an admirable account of Morocco from our late secretary, Admiral Washington, and that was the paper we looked to as the highest authority on the subject for thirty years, until we received the account given by Mr. Rohlfs, who turned the flank of the Atlas. He landed at Aghadir, south of the mountains, and made his way to Tafilet along the southern slopes. I think the Vicomte de Foucauld also crossed the Atlas. We had interesting letters from Sir Joseph Hooker. Sir Roderick Murchison gave us an admirable picture of the part of the Atlas he explored. Mr. Moore, I believe, ascended to a height of 12,000 feet. The next traveller was our friend Mr. Thomson, who took the same route as Mr. Harris, but was turned back by that old ogre the Khaid of Glawa, whose castle was so admirably depicted on the sheet. Mr. Harris has given us an account of the whole of this land such as we have never received in this room before. He has described to us the chief peaks of the Atlas and the picturesque valleys and gorges. He told us before he came here that the scenery was ugly; I must say it will be the opinion of this meeting that the pictures belie that description. More magnificent and picturesque scenery I never saw. Mr. Harris explained to us the most interesting method of irrigation adopted by this people, which has rendered fertile such vast tracts of country that would otherwise be desert, including Tafilet. That same system, many of us will remember, is also used in Eastern Persia and Afghanistan, as it was by the Incas of Peru in the coast valleys. It is extremely interesting to see how such different peoples adopt the same system for their requirements. We have many other things to thank him for. We have to thank him for having been the first Englishman to cross the Atlas mountains and reach this mysterious oasis of Tafilet. We have to thank him for this most interesting paper and the fine illustrations, the best I have seen since I have had the honour of presiding here; and I hope Mr. Charles Ingram, who, I believe, is present, will allow me, on the part of this meeting, to render to him our very hearty thanks for the exceptional favour of allowing these pictures to be shown. We also have to thank Mr. Harris for the admirable delivery, and the way, I am quite certain, in which he made every word he spoke clearly heard in every part of these rooms. For all these favours I propose a vote of thanks, and I am sure that it will be carried by you with acclamation.

MR. HARRIS'S MAP.—This map has been reduced from a rough route survey made by Mr. W. B. Harris.

FOUR MONTHS OF TRAVEL IN BRITISH GUIANA.*

By GEORGE G. DIXON.

THE object of the paper which I am about to read is to place before you the result of a journey lately undertaken by me in that portion of British Guiana known as the North-West District. I started from Arawatta, an Indian settlement above the first falls on the Barima river, overland, to near the head of the Akaribissi creek, and following the course of this creek to its junction with the Kuyuni river, then up the Kuyuni to the Government frontier station at Yuruan; secondly, from Yuruan down the Kuyuni to the mouth of the Takutu creek, and from thence overland to my original starting-point on the Barima; thirdly, up that river to its source in the Imataka mountains.

As circumstances obliged me to limit my travelling paraphernalia to the barest necessities, I was only able to take with me a compass, a level, and an aneroid; therefore my observations were necessarily of a very limited nature.

I set out from Georgetown on April 19 last, with provisions for four and a half months, and six Indian carriers, who, being of various tribes, would also act as interpreters when required.

The steamship *Penwortham* landed us at daybreak on the 20th at Morawhanna, the seat of government of the North-West District, a well-arranged and healthy town, surrounded by cultivated lands, standing where only six years ago all was swamp and desolation. From here, thanks to the kindness of Mr. im Thurn, the Government agent, my journey to the foot of the first falls in the Barima river was greatly facilitated. Two years ago the course of the Barima, from the mouth of the Anabissi creek, was rendered dangerous even for small boats by the quantities of sunken timber, which impeded navigation at every turn. Now, thanks to the energy of the Government, matters are greatly improved, and its course has been sufficiently cleared to admit of the passage of steam-launches to the foot of the first falls.

For about 100 miles the river winds between low-lying banks, thickly covered with tropical growth, the first indication of high ground on the right bank being an isolated hill called Mount Everard, which is the highest point reached at present by the coasting-steamer from Georgetown. From its summit, which has been cleared, an extensive view can be had to the north-west, the country, as far as the eye can reach, presenting a level appearance, broken only occasionally by insignificant hillocks, and everywhere clothed with thick forest. Twelve miles above Mount Everard is the Government station of Koriabbo, built on a slight elevation on the right bank. At the back of this, southwards, small hills and ridges rise out of swamp. On nearing the falls the nature of

* Paper read at the Royal Geographical Society, February 11, 1895. Map, p. 408.

the ground begins to change, assuming a bolder character; and at the junction of the Maniakura creek with the Barima, spurs of the Imataka range come down almost to the water's edge, having an elevation of some 400 feet above sea-level, rising gradually from the flats, their summits rarely exceeding a few feet in width.

From Koriabbo my journey was made in a tent-boat, propelled by paddlers up the winding Barima, whose course is so tortuous that few of its reaches exceed 500 yards in length. Four days of constant paddling brought us to the foot of the falls, and here the boat had to be unloaded and hauled over them, the stores being carried overland.

On the evening of the following day, after passing more smaller rapids (over all of which the boat had to be dragged, the river being very low), we arrived at the Indian village of Arawatta. It takes its name from a local superstition that some rocks in the river hard by are inhabited by howling monkeys (called "Arawatta" by the Indians), whose weird cries may occasionally be heard (according to the legend) when Barima is in flood. The head man of the settlement, a semi-civilized aboriginal with whom I had had previous dealings, allowed me to leave the stores we did not require for our journey to the Kuyuni at his house. We started on May 1, following an old Indian trail, which lead us southwards over an undulating country traversed by innumerable creeks; we were, in fact, travelling over the divide between the Arakaka Paru and Whanna creeks, tributaries of the Barima. Nearly every flat showed signs of having been prospected for gold in a perfunctionary fashion, several were being worked, whilst others had been partially stripped of their top soil and then abandoned. As we travelled southwards we left behind the Mora trees (*Mora excelsa*), with which up to the falls the banks of the river are covered, their place being taken by crab-wood (*Carapa guianensis*), cork-wood, cedar, and locust-gum (*Hymenæa courbaril*), and where the ground is more elevated, the purple-heart (*Copaifera pubiflora*). After walking for an hour and three-quarters, we came to the placer workings of Messrs. Garnet, the most extensive in this locality. Here in many places appear dolerite rock, and quartz croppings can be traced for some distance.

On leaving this mining-camp, we proceeded due south down an old prospecting-trail, which is crossed in many places by outcroppings of quartz. After traversing two small ridges of 550 feet above sea-level, we reached the main ridge of the Imataka mountains, which I followed in a westerly direction, until I gained the summit of one of its highest points, 880 feet above the sea-level. Here I opened a clearing to the north-east, so as to get a view of the camp we had left the day before. I was amply repaid for the trouble and delay, by the magnificent panorama the Indians' axes disclosed to view—everywhere undulating country clothed with dense tropical forest. There were occasional

small ridges, generally not more than 300 feet above sea-level, with here and there a higher point having an altitude of perhaps 800 feet.

Having thus obtained a good view of the country to the north of us, I had a clearing made southwards to overlook our line of travel, and this disclosed several high hills to the south-east, and a branch ridge of the Imatakas running south-west.

Early on the morning of the 11th we broke up our camp, and, returning to the south line, followed it to its termination, and then commenced cutting a due south compass-trail. When descending the southern slope of the Imatakas, we were on the water-parting of the Barima river, and crossed creeks having a swifter current than any we had yet met with. Other beds were full of small boulders, which the force of the current had heaped one upon another. Even in the very heads of these creeks the boulders were rounded by the action of water, and in the soil itself stones of a similar water-worn character might be traced.

On several occasions I came upon heaps of water-worn rocks, weighing from a few pounds to several tons, piled in great masses upon the tops of some of the smaller ridges, leading to the supposition that at one period the whole of this region was submerged. Another small stream, whose course we followed for some distance, flowed over a bed of hard doleritic rock. Late in the afternoon of the 14th we arrived at a new Caribisi settlement on the Waiari creek, a tributary of the Barama river. Here we obtained provisions and carriers, who took us to their principal village on the same creek—which settlement consisted of some six houses, surrounded by a fine clearing abundantly stocked with cassava, yams, sugar-cane, pineapples, guavas, water-melons, lime-trees, cotton, etc. The means of communication between the Indian villages overland is by trails through the forest, which are, in many cases, so indistinctly defined that only the practised eye of an aboriginal could detect and follow them. Often the bush is not even cut, only a twig being bent down here and there to indicate the track.

In company with the head man of the settlement, we re-crossed the Waiari creek and the Wakenamo creek, and at midday stopped at a settlement on the Kwematta creek, which has three considerable falls. Our guide volunteered the information, that at its head is a high mountain with a lake on its summit, reported to be the haunt of the Di-di (a fabulous creature of Indian superstition). It is also believed that the fish inhabiting its waters are poisonous. I made an unsuccessful attempt to find this hill, but met with very lukewarm support from my companions, with whom it had a bad reputation.

From the Kwematta settlement I followed the creek to its junction with the Barama, and, being fortunate enough to obtain two bark canoes, went down the Barama river to the settlement of Arrosiko, on the right bank (situated below the junction of Unama creek with

Barama), which is the starting-point of the Indian trail to the Kuyuni river. Near the mouth of the Kwematta creek, I met with the most extensive brakes of the small-leafed variety of bamboo I had yet seen.

From Arrosiko our road led us along the banks of the Unama creek (here about 60 feet wide), until we reached the settlement of Turro-turro, where we found six men, and the usual complement of women and children. They were all painted in a most extraordinary fashion, one man's face being a study in Roman figures done in red paint, while a woman had a patch of the same colour encircling her mouth, with lines running back to her ears, which gave her the appearance of wearing a red respirator.

As we neared Akarabissi creek, the character of the ground again changed from flat to undulating, with hills from 100 to 150 feet above the flats, and 400 feet above sea-level. Our roads joined the Akaribissi creek where it was about 20 feet wide, and coming from the north. We followed it down-stream, our track constantly crossing and re-crossing it over the trunks of fallen trees. I decided to camp where I was, in order to make my wood-skin canoes. After a delay of two days, we launched our self-manufactured boats and started down the creek; but we soon discovered that our journey was not to be an easy one, as the water had fallen considerably, and the bed of the stream was a network of sunken timber, making it no easy task to navigate the canoes through the many obstacles which blocked the passage. At last, after endless trouble, we arrived at the Kuyuni river.

Inexpressibly delightful indeed it was, after having lived for weeks in the perpetual gloom of the forest, to emerge into the glorious sunshine, and to see once more the open sky above us, and the magnificent island-studded river stretching east and west as far as the eye could reach. Even the unemotional Indians with me were stirred to some show of feeling by our change of surroundings.

After leaving Akaribissi mouth, I proceeded up-stream to the mouth of the Morawan creek.

After several days' delay in search of food, we started up the river. Early on the third day of our journey we passed the Kurumu river coming in on the left bank (called by the Venezuelans, Botonamo). On a tributary of this river is built the Venezuelan town of Tumeremos.

Near the mouth of this river it is reported that the Venezuelans had a fort, but there is no habitation of any kind to be seen now. Later in the day we came to the Kaliaku hills on the right bank. These differed in character from any we had yet met with. In place of the usual thickly wooded sides terminating in a narrow ridge, they had perpendicular fronts scantily covered with bush, and appeared to have a level surface on the top. Their faces showed unmistakable signs of the action of water. Just beyond we passed, on the same bank, a large triangular clearing, which I was informed was the site of a former

settlement of the Venezuelans. On the upper side of this flat the turbulent Kaliaku creek enters the Kuyuni. This creek, then in flood, bore down upon its surface masses of white foam brought from its falls just above the junction, whose roar came down to us like distant thunder. A short distance further on, the forest on the left bank showed clearly that at some former period it had been burnt. Might not this be the place referred to by Humboldt as being the most easterly possession of the Spaniards?

On June 10 we reached the foot of the Paragua cataract, and, the river being full, we found great difficulty in handling our canoes, which were extremely frail. Although we accomplished our passage in safety, we had some very narrow escapes.

On the morning of June 13, I awoke to the unpleasant reflection that I had to serve out the last ration, and must therefore reach the Yuruan station that day, or go without food. I explained the situation to the men, and, with so powerful an incentive to push forward, all did their best. We had not seen any human beings for several days, so could not tell what distance we were from Yuruan. The men pulled well, and the stillness of the great river was only broken by the monotonous splash of the paddles; all eyes were strained to catch any sign of the presence of human beings, and so we journeyed on in silence. Suddenly one of the red men in the leading canoe made a sign for all to be quiet. Immediately the paddling ceased, and faintly from the far distance came to us over the water a succession of sounds rising and falling in regular cadence. Each man looked at his neighbour, and, after a moment of anxious listening, shouted simultaneously, "An axe! an axe!" There was no need then to urge them on; each man strained at his paddle as if his life depended on his exertions, for at the end of that axe was there not a fellow-creature?

On arriving at the place from whence the welcome sounds had come, we found a Caribisi Indian engaged in cutting out a paddle. The man could speak Spanish, so from him I learnt that we were only a few hours distant from Yuruan station, and that the rapids ahead of us were insignificant. This we found to be the case, as we paddled through them without any difficulty, and soon after midday came in sight of our most westerly station—a plain frame building surmounted by the British flag, where are quartered an inspector and six policemen. The Yuruan river and its tributary, the Yuruari creek (both of which are a succession of cataracts), enter Kuyuni on the left bank exactly opposite the British station.

On the Yuruari creek are situated the Venezuelan mines of El Callao, Peru, Chile, Panama, and many others, and the discoloured water flowing from their stamp mills passes down the creek to the Kuyuni. The surrounding country is undulating, and the forest near the settlements on either bank of the river has evidently been burnt at no very

distant date. Outside this area it abounds in balata (*Mimusops balata*) and locust trees (*Hymenæa courbaril*). As regards the British station, both site and building leave room for improvement. As far as I could judge from information obtained from those resident in the district, it is a fairly healthy one.

From here I made several expeditions, and visited the officer in charge of the Venezuelan outpost, who received me most courteously. Their station consists of three or four thatched adobe houses, surrounded by clearings well stocked with provisions and pasture for the cattle, and for the mules and donkeys which are used for carrying freight and for riding. There is a very good mule-track, connecting the station with the town of Tumeremos, about 30 miles distant, from whence they draw their supplies. This mule-track is now being opened out into a cart road, and telegraph communication is being put up to connect the station with Caracas, *viâ* Tumeremos. This made me, as an Englishman, feel considerably mortified to think that it takes our Government from five to six weeks to reach their frontier station, whereas the Venezuelan outpost was then being put, and by this time probably is, in direct communication with their capital by road and wire. Also, whereas it costs our Government an immense annual sum to maintain their small number of police at Yuruan on salt and tinned provisions (sent all the way from Bartica Grove, on the Essequibo, in paddled boats), within 200 yards on the other bank of Kuyuni is the Venezuelan outpost, supplied with all kinds of fresh food from their cattle farms and plantations.

I found the Venezuelan officials ready to accommodate me in every way, and from them I obtained fresh beef for my return journey, on which I started on the 19th. Our passage down the rapids was not destined to be by any means an easy one.

After much damage to our canoe, sometimes running the risk of total wreck in the rapids, and after much delay through darkness and rain, we reached Kaliaku in safety soon after midnight on the 20th. On the 22nd we landed at the mouth of a small stream called Kalaraparu, on which is a settlement of Caribisi Indians, from whom we obtained a sufficient supply of cassava bread for our return tramp overland. The remainder of our journey down the Kuyuni we accomplished with little difficulty.

On June 27 we bade farewell to our dilapidated canoes, and started on our land journey from Takutu creek. The road led us at first over flat ground, becoming more hilly as we left the river behind us. After passing the village of Takutu, we continued our journey to Simiriundui, at the head of the creek, which rises in a spur of the Imataka mountains, over which we crossed at an elevation of 450 feet above sea-level. We followed this ridge for a short distance to the source of the Unama creek, a tributary of the Barama river. A few hours' walk from

Unama Head brought us to the track cut some months before by the Government, from the Barama to the Akaribissi creek. Our road followed the banks of the Unama creek over very broken country, rising from 150 feet to 350 feet above sea-level, to the village of Turroturro. From this point I returned to the Barima by my original route (with the exception of a short walk overland from Arrosiko on the Barama to the village of Kwematta), and arrived at Arawatta on the Barima, my original starting-point, on July 8, after an absence of nine weeks and five days, during which I had proved beyond doubt that the Yuruan frontier station can be reached in fourteen days from Georgetown at the present moment, by steamer to the Barima falls, on foot overland, by the route I have opened, to Kuyuni, and in paddle-boats up that river.

If a railway were made to connect the Barima with the Kuyuni, and a steam-launch put upon the latter river, the frontier could be reached in four days from Georgetown.

On July 9 I loaded my boat with the provisions I had left behind in the Indian's house, and at midday started up the Barima river. A short distance above Arawatta the Whanamo-paru Creek comes in on the left bank, and the Whanna on the right bank, after which the river narrows considerably. As it was then in flood, we had such difficulty in pulling against the stream, that I was reluctantly forced to camp early on the following day and wait for the rush of water to abate. To my great relief next morning, I found that the river had fallen 3 feet, and we were therefore able to resume our journey under more favourable circumstances. On the 12th we reached a group of falls, where we were compelled to unload and haul over the boat; after passing these, the riverside store-houses of the first placer workings came into sight on the right bank, and at nightfall we camped at the foot of more rapids. At daybreak the empty boat was dragged over these, reloaded, and started afresh.

We then paddled on with little difficulty until we reached the Harrison falls, the most dangerous the gold-diggers' boats have to pass at present. Here the river is precipitated over a shelf of rock with a drop of 5 feet into a narrow channel running at right angles with the stream, making it most difficult and dangerous to pass the boats over. On the right bank opposite these falls are more store-houses; and on the 14th we arrived at another group of these buildings, the last habitations on the Barima, one hour and a half's walk below Rocky river.

After a delay of ten days building wood-skins, we left on July 24 in three canoes, and, after passing several rapids and the mouth of the Rocky river (the last branch of the Barima marked on Sir Robert Schomburgh's map), arrived at the finest falls we had yet encountered, called by the Indians Baramba. The fall is in the form of a horseshoe, with an island in the centre; between this and the left bank there is a drop

of some 12 feet, and on the other side the water rushes over a mass of boulders.

This is the highest point reached by the Government expedition sent up to ascertain the truth of a report made by the Indians, that the Venezuelans had passed through here on their way to Kuyuni. On a tree on the right bank are cut the letters "V.R." surmounted by a crown, which, until I passed, was supposed by the miners in the district to be the mark indicating the boundary. On the 28th we passed a creek called Kaliaku on the right bank, which was very little smaller than the Barima itself, and soon after this came to the highest point as yet reached by prospectors for gold.

Three days afterwards we decided to make the rest of our journey overland, as the river had become so small and shallow that we had continually to get out and wade, pulling the canoes after us. As soon as our tents were pitched on the right bank, and the canoes unloaded, I and two men started overland, cutting a due west compass-trail. After about 4 miles of this laborious work, still continuing cutting, we followed the river, which here flows between high hills, and on August 2 came to the highest falls on the Barima, a lovely spot, where the water shot over a ledge of doleritic rock 40 feet in height, falling in beautiful cascades into the basin below. Knowing that if the head of the river was not reached that night, there would be no chance of doing so next day (as our last ration was expended, and we were a long distance from our boats and main supply of food), that same afternoon at three o'clock, whilst my companions prepared the camp for the night, I continued my exploration up the narrow valley. At 4.30 I arrived at my journey's end, and the head of Barima, which rises in a steep gorge, at the head of which, on the ridge of the Imataka mountains, at 950 feet above the sea, I cut "V.R." and a crown on a large tree, marking several others, and cutting down a few saplings, to leave unmistakable signs behind me that the spot had been visited by an Englishman.

So the question as to where the river rises, and what manner of country it rises in, is settled. Instead of its source being in savannah as reported, it is in heavy forest, and there is no indication of any living being having visited it before.

On August 4 we re-loaded our canoes and started down-stream, little thinking what was to befall us on our journey.

The river had lowered, and the obstructions in the channel had therefore increased. Early in the day, on turning a sharp bend, one of the boats struck against a sunken tree, and went to the bottom with all on board.

After a long delay we regained most of the cargo, and continued our journey, passing several creeks in flood, which swelled the river considerably. Suddenly the foremost canoe, in which I was, capsized. I just scrambled out on to a tree in time to see the second canoe carried down by the stream on to the top of the sinking one, and both go to the

bottom, with five of my companions and all my worldly possessions, with the exception of some clothes, a little tea and coffee, some rice, and an old kerosine-oil tin, which were in the third canoe! After some difficulty we succeeded in regaining our canoes, to one of which was attached the tent. The morning after this catastrophe, breakfasting hastily on the rice (to which the improvised saucepan imparted its own peculiar flavour), we continued our way back to civilization, keeping a sharp look-out for any kind of game, and were lucky enough to shoot a water-hass, or river-pig, which we cooked at the first convenient landing-place. We pulled on until late in the evening, and at 6.30 arrived at the Baramba falls, over which we passed our canoes, and camped at their foot, encouraged by the thought that, if anything went wrong, it would take only four or five hours' good walking, and a swim across the Rocky river, to put us once more within reach of food and civilization. We arrived at Morawhanna on August 12, after an absence of sixteen weeks.

At the conclusion of the meeting, the PRESIDENT said: Mr. Dixon has done some extremely valuable work in helping to settle the future boundary to be demarcated between British Guiana and Venezuela, and has gone through much greater hardships than he has described; and I believe Mrs. Dixon had the heroism to accompany him in his journey. We have to thank him very much for a most interesting paper on one of the finest countries for observing tropical vegetation that exists.

MR. DIXON'S MAP.—The following maps have been used in the compilation of the map of "Part of British Guiana and Venezuela:"—Admiralty Chart, No. 1801; Sir R. H. Schomburgk's Map of British Guiana; Codazzi's Mapa Fisico-Politico de Venezuela; Bianconi's Carte de Venezuela. The map of the Barima River has been constructed from a compass survey by Mr. G. G. Dixon, in which the distances were estimated and checked by time. The lengths of the tributary streams, with the exception of those followed up by Mr. Dixon, must be considered as roughly approximative. The heights of the ridges are from aneroid readings.

A JOURNEY ROUND MELVILLE BAY.

By EIVIND ASTRUP.

As a member of the second Arctic expedition under the command of Lieut. Peary, I had an opportunity last spring of undertaking a sledge journey from the winter quarters of the expedition in Inglefield gulf, on the west coast of Greenland (77° 45′ N. lat.), to the unknown shores of Melville bay. This journey, which was the longest sledge trip made during the last season in the Arctic regions, resulted in a few geographical discoveries, which I will now proceed to explain.

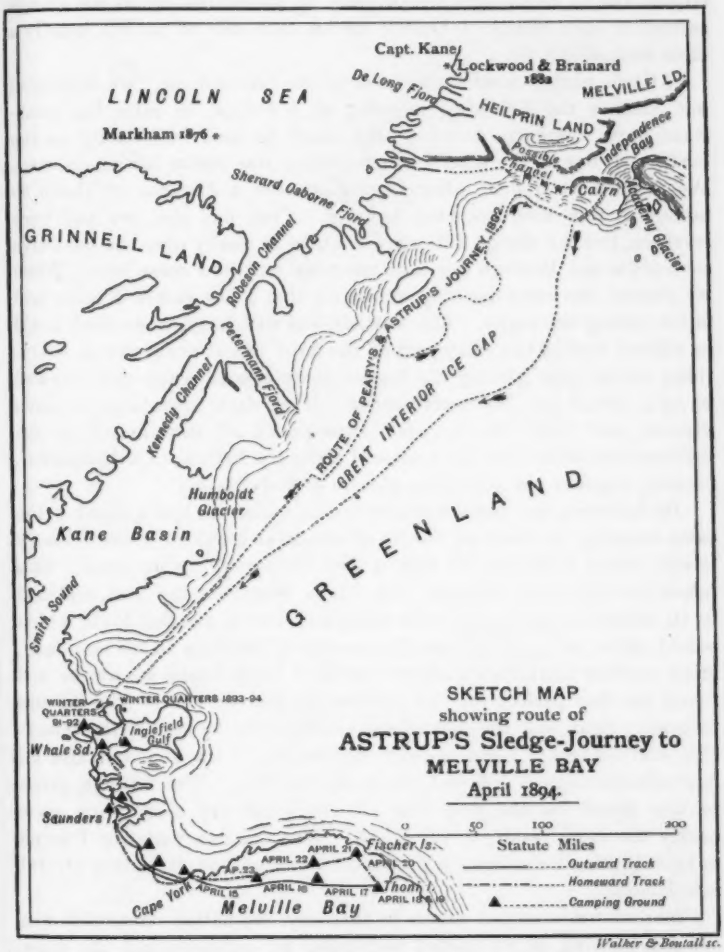
Before I enter into the description of the journey itself, I will say a few words regarding my outfit, which, I am sorry to say, was for many reasons somewhat defective. Of instruments, I had a so-called railroad compass, with which horizontal as well as vertical

angles could be taken, a thermometer, a watch, a pocket-compass, a pair of field-glasses, snow-goggles, charts, tables, etc. Of provisions we had a small quantity of tea, sugar, pea-soup flour, army bread, and bacon; besides two rifles, fifty cartridges, and a small native stone lamp for a blubber fire, alcohol or kerosene being at that time unobtainable from the stores of the expedition. Further, I had a few deerskins, a hatchet, and finally some extra rabbit-skin stockings and kamiks (sealskin boots). As regards my meat-supply, I was obliged to rely in this respect entirely on the game I might find on my way. I therefore secured before my departure, as my companion, an exceptionally skilled and faithful young native hunter, named Kolotengva. Of dogs I had borrowed and bought from the natives a team of eight strong animals; while our sledge was constructed, shortly before our departure, by my companion and myself on the native pattern, with ivory shoeing under the narrow wooden runners.

On the morning of April 6 everything was ready for a start, and, although the weather was somewhat doubtful with a cloudy sky, and the air, meteorologically speaking, forebodingly mild (3° Fahr. above zero), we got off at about 9.30 a.m. The bay was full of heavy white fog-banks, and a sharp north-east wind swept down over the naked hills behind the head-quarters. The first week of the journey was spent in reaching the starting-point of my investigations, namely, the southernmost of the native settlements of North Greenland, situated at the western headland of Melville bay, Cape York; it is superfluous here to describe this part of our enterprise. On the accompanying map, however, our journey may be followed in its entire length, our route and stopping-places being marked, and the dates during which the different marches were made being given.

About midnight on April 11 we reached the above-mentioned settlement at Cape York, and here we remained during the 12th, 13th, and 14th, partly to give our dogs a rest, partly kept there by stormy weather. Early in the morning on the 15th we finally continued our journey eastward in clear weather, and my plan now was to reach the islands shown on the map to be situated along the shores of Melville bay. From these islands I hoped to get a good view of the unexplored coasts inside of them, in case it should prove impracticable, on account of the condition of the ice, to reach the shores themselves. In the forenoon we passed Bushman island, which is situated about 12 miles (naut.) east of Cape York. Before I reached this island, I discovered that the coast close to the north of us did not belong to the mainland itself, but to two islands, hitherto unknown, of considerable size; thus they made the firstfruits of the comparatively rich geographical harvest which the following day's journey yielded. In the afternoon, as we reached further eastwards, we soon sighted numerous distant glaciers of gigantic size, which I always had anticipated would exist along the

north-eastern shores of Melville bay. In fact, all the way from Cape York, and eastward as far as I could see, I found the coast-line continually broken by large and active glaciers. At 6 o'clock in the afternoon we stopped, after having covered a distance of over 40 miles since



Walker & Boutall sc.

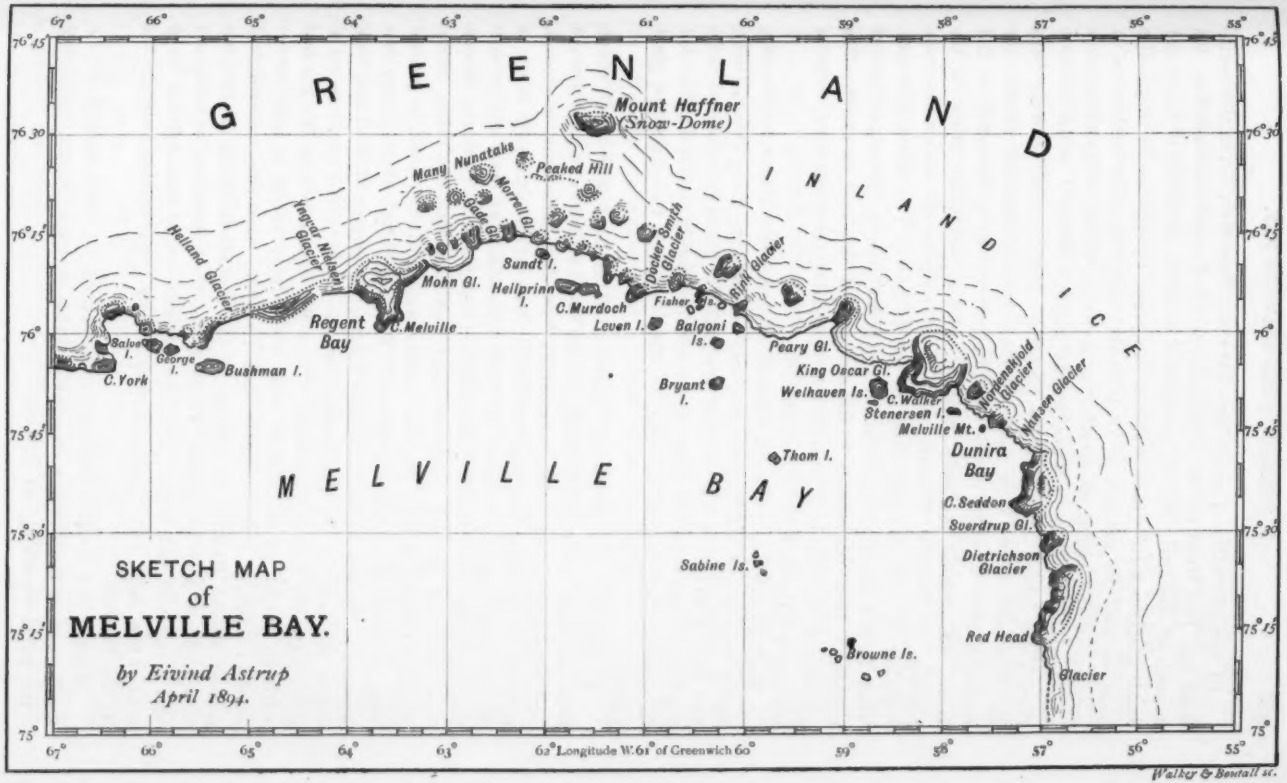
morning, and built our usual little snow hut for protection during our sleep. We were then almost due south of a black and very conspicuous mountain-wall, a little to the east of Cape Melville, and not over 8 miles from the nearest shore. The ice over which we had travelled this first day from Cape York was very smooth, and quite different from what I

had expected. With the exception of a border of ice about a mile in width, the surface of which was composed of broken and irregular ice-pieces, often reaching a height of from 6 to 8 feet, all the rest of the way was perfectly level and smooth. I noticed, however, that this was largely due to Kolotengva's experience in ice-navigation, as we always seemed to have plenty of broken ice on each side of us, but usually a clear road ahead.

After a night's comfortable rest in our "snow-dome," we continued our journey the following morning at 8 o'clock, in calm but somewhat hazy weather. At noon land could be seen indistinctly to the north-east, but in the afternoon everything was again hidden in mist. We camped at 5 p.m., after having covered a distance of about 30 miles; it was then snowing heavily. That day also we had very level ice, but the sledge did not run quite as easily over the sand-like snowdrifts and through the loose snow we had now come into. When we started the next morning, we found that a few inches of snow had fallen during the night. The weather was still hazy, so no land could be sighted during the early part of the day; but at noon, just as everything looked most gloomy, the fog suddenly cleared away and revealed to us a grand and impressive scene. High dark mountains, gigantic glaciers, and lofty, bluish-tinted snow-peaks, all illuminated by the brilliant rays of the sun, lay scattered along the horizon in wild disorder, forming together the attractive picture of Melville bay.

By following the east-south-east course which we had entered on the same morning, we reached, in the afternoon at 6 o'clock, a small lonely island, where I decided to stop a day for surveying purposes. This island proved to be identical with Thom island on the map, and had in its centre a cone-shaped rock-formation, 300 to 400 feet high, which would afford an excellent spot for a series of bearings to the mainland. After another comfortable night's rest in a snow-house, we awoke and found the day perfect for the purpose we had in view. The air was unusually clear, and the most distant cliffs could be seen with remarkable distinctness. I got a good observation of the sun, and also all desirable bearings to different points on the shore. The latitude given to this island on the map was 75° 40′, while my observation gave nearly the same result, or 75° 41′ 44″. The compass variation I found to be 88½° W. I also drew a profile of the shore-line, including several new islands.

While I was occupied ashore in this way, my native companion was out seal-hunting, as we needed both meat for ourselves and the dogs, and blubber for our cooking-stove. He succeeded in killing a medium-sized specimen in less than an hour's time. Through my field-glass I watched him creeping up to the animal, until at last it looked as if he could touch the seal with his hand, from which position he fired and killed it.


GREENLAND
INLAND ICE
Mount Haffner
(Snow-Dome)
Peaked Hill
Many Nunataks
Morrell Gl.
Gade Gl.
Knuth Nielsen Glacier
Helland Glacier
Mohn Gl.
Sundt I.
Heilprinn I.
C. Murdoch
Docker Smith Glacier
Fisher Is.
Kirk Glacier
Regent Bay
C. Melville
Salve I.
George I.
Bushman I.
C. York
Leven I.
Balgoni Is.
Peary Gl.
King Oscar Gl.
Welhaven Is.
C. Walker
Stenersen I.
Melville Mt.
Bryant I.
Thom I.
Dunira Bay
C. Seddon
Sverdrup Gl.
Dietrichson Glacier
Sabine Is.
Browne Is.
Red Head
Glacier
MELVILLE BAY
SKETCH MAP
of
MELVILLE BAY.
by Eivind Astrup
April 1894.
67° 66° 65° 64° 63° 62° 61° 60° 59° 58° 57° 56° 55°
76° 45' 76° 30' 76° 15' 76° 75° 45' 75° 30' 75° 15' 75°
Longitude W. 61° of Greenwich 60°
Walker & Boutall sc.

Of the 130 miles of coast-land between Cape Melville in the north-west and Red Head in the south-east, which I could overlook from the summit of the little island, upwards of 90 miles consisted of large and small glaciers, all of which, without exception, I judged to be very active ones, as well on account of their broken and irregular surface as on account of the enormous number of icebergs which everywhere were visible along the coast. When to the glaciers which I could overlook from Thom island are added the glaciers which I found between Cape Melville and Cape York, and, further, the colossal-ice stream the northern part of which could be indistinctly seen to the south of Red Head, and which probably extends almost unbroken down to the regions of Devil's Thumb, this great number of ice-rivers make together a total moving mass of ice of nearly 150 miles in width. They form a tremendous outlet for the great interior ice-cap, and are, of course, of great importance to the economy of this vast ice-sheet. The glaciers of Melville bay form in reality the largest successive series of ice-rivers hitherto found in Greenland.

Most of these glaciers are situated exceptionally close to each other, and as to some of the larger ones—as, for instance, King Oscar, Peary, and Rink glaciers, or Nansen and Nordenskiöld glaciers—the land interruptions which separate them are so comparatively inconsiderable that in reality they might as well be considered as two immense giant glaciers.

In regard to the geological character of the coast-land itself, which here and there projected through the icy crust either as imposing capes and forelands or as lonely "nunataks" further back from the coast, nothing of unusual interest could be discovered, although there is doubtless here, as everywhere in North Greenland, an open and productive field for more detailed scientific investigation. The trap formation, with its gloomy colour in sharp contrast with the white snow-domes, appeared to be of frequent occurrence, while the coast in general was, as usual, of archæan structure. The steep bluffs of the coast-land nearest to the sea-ice had a regular height of a couple of thousand feet, while the land in the background, wherever there was any, rose up to a considerably higher elevation. Thus the dome of Cape Walker had without doubt an altitude of over 3000 feet; while a lofty snow-covered dome, at least 15 miles back from the coast-line, and which I named Mount Haffner in honour of the President of the Norwegian Geographical Society, Colonel Haffner, had the appearance of being not less than 5000 feet high. At Cape Melville there was quite a large area of low land, but of what nature it was I was unable to make out in the distance.

When I had finished with my observations on the island, I built a small cairn on the summit, and placed in its centre a tin can, containing a few notes regarding my journey.

When we looked out the following morning at 5 o'clock, the weather had changed entirely. A strong southerly gale was blowing, filling the air with drifting snow. We had, therefore, to spend the day indoors, which would have been unpleasant enough for me but for my native companion, who told me many interesting facts illustrating the extreme pluck of these people during their hard existence in this remote region. Among other things, he told me that the bear-hunters of the tribe very frequently went over to the east side of Melville bay, and also that the present condition of the ice for sledge-travelling was not exceptionally favourable. Judging from my own experience in Melville bay, and, further, from the information I have gathered from the natives, but principally from what I have seen myself of the travelling ability of the Whale Sound natives, which is truly remarkable, I believe that there is no reason why they should not be able to communicate every year regularly with the most northern Danish settlements, if the necessary inducements were at hand. It would perhaps, in certain seasons, necessitate over-land travelling in one or more places; but, as their supposed superstitious fear of the inland with its great ice-cap does not exceed that of the average white man, this circumstance would be no serious objection to the practicability of the journey. It is true that their hunting and exploring trips have hitherto been limited to the more northern part of Melville bay, but, according to their own statements, this is by no means, as supposed by certain previous authors, caused by the numerous glaciers or other imaginary hindrances, but solely by their perfect ignorance of the close proximity of their long-lost southern brethren.

Next morning, April 20, a strong wind was still blowing from the south. Once more we were almost without meat and blubber, therefore we did not consider it advisable to move farther away from Cape York, which we might have done had the weather been more favourable. Instead of this, we now directed our course towards the north-eastern, and wholly unknown corner of the bay, where I expected to find much of interest, and also hoped to meet with good hunting luck. We started at 7 o'clock in the morning, with the course directly for Cape Murdock, that is the distant bluffs, which, according to the map, I considered to be this cape. As I got near, however, I discovered that these steep cliffs were nothing but a lonely nunatak, situated far in the broken, irregular surface of an imposing glacier. At 1.30 p.m. we reached a little island, which on the inside almost touched the glacier face. As the place commanded a good view of the surrounding country, and as the fog which we had encountered in the morning had mostly cleared away, I told Kolotengva to build our usual little snow-house near the beach, while I took the instrument and ascended the 300 to 400 feet high summit of the island, to get a few compass bearings. After a while I was visited by Kolotengva, who also wanted to get a good

view of this desolate corner of the great ice-fields of Melville bay ; but even to the modest native this place seemed to offer no attraction. He shook his head dubiously, and said with the fulness of conviction, "Pujungitoksua nuna manni" ("This land is no good"). The rocky ground was everywhere covered with large snowdrifts, swept down by the frequent winds from the near glaciers. Here and there, where the rocks projected through the snow, the old markings of former glacial activity could be observed. The sights I got were not many, on account of the returning mist; therefore I soon returned to the igloo, marking the summit with a small mound of the few stones that could be found.

The following morning, soon after our start, we succeeded in killing a large bear, the meat of which was received with equal gratitude by ourselves and our dogs. Our course now went directly for an island about 10 miles west-south-west of yesterday's camp, where I stopped a couple of hours to get an observation of latitude, and also a set of bearings, as the weather now had become perfectly clear. At 5.30 in the afternoon we made camp, after an interesting but very toilsome day. We covered a shorter distance during this march than usual, or about 25 miles, as the snow had been deep and soft, and the going heavy.

The following days, April 22 and 23, during which we enjoyed the best of weather, brought us safely to Cape York. Here we remained the next two days, as the weather was stormy and the dogs needed some rest. On the 26th, at 6 a.m., we resumed our journey, no longer alone, but in company with thirty-five natives, with eight sledges pulled by forty-five dogs. In other words, it was the whole Cape York colony on the road, each family with their complete outfit of skins, harpoons, stoves, children, and meat. Before night, however, many of them had left us, pitching their tents at different places along the coast. We spent the night at the head of a little bay running in to the west of Conical Rock. Here we also remained the following day, starting late in the afternoon to take advantage of the night for travelling. We advanced very rapidly, reaching the western end of Saunders island at four o'clock in the morning, where we made camp. On the south side of the island we passed that night an Eskimo settlement named Akpan, which was, however, deserted at the time. Yet I mention the place, as there are here, as well as on the mainland right opposite, on the south side of Wolstenholm Sound, old stone huts, which long since have been abandoned by the natives on account of the intruding sea-water, while afterwards new huts have been built further in on the beach and at a higher elevation. Similar signs of a sinking coast-line were noticed somewhat further to the south by Dr. Kane, who supposed the axis of the movement of oscillation to which the whole Greenland mass is generally believed to be subject to be situated somewhere to the south of the 77th parallel. According to the fact just stated from Saunders island, and judging also from reports confirmed by a great number of

PROFILE OF THE NORTH SHORE OF MELVILLE BAY.

reliable natives, many of whom were old men, that the land is slowly sinking, or, as they expressed it, the water rising, both along the south side of Whale Sound and on Northumberland island (lat. 77° 15′), there seems to be reason to believe that the axis of this somewhat imperfectly demonstrated oscillating movement may be situated somewhat further to the north than hitherto supposed.

At 9 o'clock in the evening on April 28 we left Saunders island in magnificent weather, and two days later, on April 30, we again sighted the winter quarters of the expedition with its familiar surroundings, and our little journey was at an end.

Before I close my report, I will add a few words with reference to the accompanying map of Melville bay. As can be seen from the report, it is the result of a necessarily hurried and rough survey, and can hardly be called more than a sketch-map. The position of its main points around the north-eastern corner of Melville bay are largely determined by sights taken from the three points of a large triangle. The dimensions of this were obtained by latitude observations in connection with compass sights. As already shown, I had no chronometer in my equipment, and I was obliged, therefore, to maintain the old longitudinal positions for Thom island and Cape York. The latter point, however, it can hardly be doubted is correctly placed on the map, as it has been repeatedly visited and its geographical position determined by Arctic expeditions and whaling-ships.

I hope that the above report, in spite of its limited results, will be of some benefit to certain branches of science, and especially to the practical study of glaciology, which at present seems to be rapidly moving towards the Arctic zone. For, outside of the fact that it may perhaps have added a trifle to our knowledge of the extensive drainage of the great Greenland ice-cap, which, according to Lieut. Peary's and my own observations in 1892, extends even to its most northern limit at the 82nd parallel, it also plainly shows the way, so to speak, to one of the most favourable localities on the surface of our planet, for detailed studies of giant glaciers, their laws of motion, and the many additional phenomena which accompany them.

COUNT GÖTZEN'S JOURNEY ACROSS EQUATORIAL AFRICA.*

This expedition was a private undertaking of Count Götzen, who was accompanied by Drs. von Prittwitz and Kersting, the last-named acting as physician. Thanks to the experience gained on a preliminary

* Abstract of paper read by Count Götzen at the Berlin Geographical Society, February 2, 1895.

expedition to Mount Kilimanjaro, such excellent arrangements were made that the whole journey from the East Coast to the Congo lasted not longer than nine months. Owing to strict temperance and a regular mode of living, and especially to the precaution to drink only boiled water, the health of all the Europeans who took part in the expedition was from beginning to end an excellent one. The expedition, which consisted of six hundred porters and two Indian elephants, started from Pangani on December 21, 1893. The elephants, however, had to be left behind shortly afterwards, as they could not be induced to cross the Pangani river; but it is possible that this was a manœuvre on the part of the leaders of the animals, who were afraid of the unknown interior. Two hundred of the porters were Wasukuma, who were engaged as far as Lake Victoria.

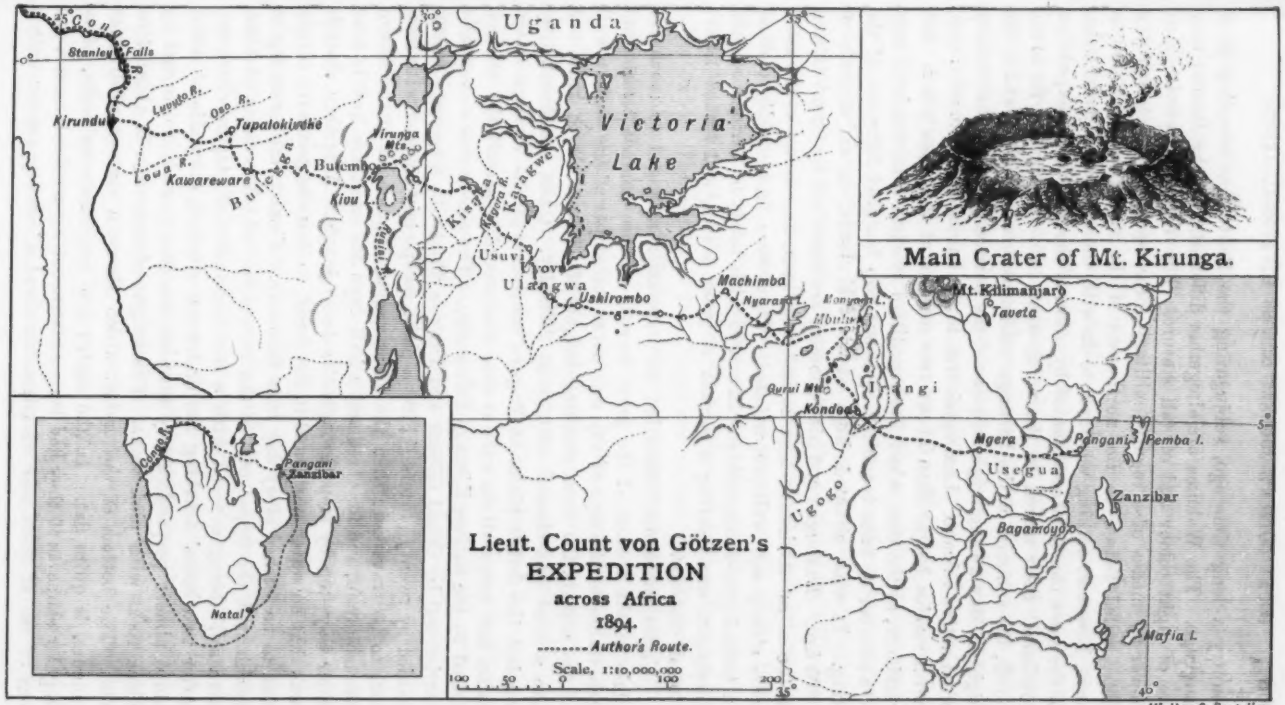
The expedition, after having passed through Useguha and Irangi, reached Mount Gurui. An attempt was made to ascend this mountain, the altitude of which was estimated at 10,500 feet; but owing to bad weather the summit could not be climbed, and the highest altitude reached was 9500 feet. The crest of this peculiar mountain has a length of 2 to 3 miles; it is narrow, roof-like, and covered with erica, cyclamen, and long grass. It was remarkable to find, in a high altitude like this, a multitude of elephant and rhinoceros foot-marks. From the mountain a hitherto unknown lake was discovered, called Umburre by the guides, and in the vicinity of the mountain five small crater-lakes were found.

The country consists of undulating plains covered by grass and trees, and abounding with game, whilst in the countries more to the west, *e.g.* on the high plateaux between the great lakes and in the Congo territories, game was found to be very scarce. Between Ugogo and Lake Victoria, Count Götzen avoided as much as possible the routes of previous travellers, and succeeded in obtaining much new topographical information. After a difficult ascent to the central plateau, the southern end of the recently discovered Lake Eiasi or Nyarasa was reached. West of it extend high plateaux, uninhabited and bleak (temp. 39° to 40° Fahr. at sunrise). Nomadic Wandorobbo are the only natives who occasionally camp in this inhospitable wilderness, where only the rhinoceros is frequent. The expedition stayed for three weeks at the missionary station of the "White Fathers" at Ushirombo, south of Lake Victoria, to engage new porters. Ushirombo is a small but independent state. The inhabitants call themselves Wazumba, and form an ethnological link between the Wanyamwezi and the Bantu tribes inhabiting the plateaux further west. The migrations of the Hamitic Wahuma tribes have extended even to these territories, but they have no political influence here, and live, engaged in pastoral pursuits, separated from the Bantu. The inhabitants are intelligent, and were well disposed towards the expedition, assisting them in every possible way in

their march through Ulangwa, Uyovu, and Usambiro. On April 20, 1894, the expedition reached the country of East Usuvi, whose chief Kassusura has considerable influence. Here the ascent to the plateaux which extend between the great lakes commences. Three distinct terraces, formed by the prevailing slate formation, have to be ascended. The residence of Kassusura, who keeps a regular army of 2000 to 3000 warriors, is situated at the foot of the third terrace, in the middle of a large banana grove. Proceeding westward, the expedition crossed the Kagera river on May 2, and entered the hitherto unknown country of Ruanda. The kingdom of Ruanda extends at present from the Kagera to the western shores of Lake Kivu, and from Urundi to the Virunga volcanoes. Luabugiri is the name of the present Kigeri of Ruanda. The plateaux are separated by deep erosion-valleys, mostly running from north to south, and covered by luxuriant banana groves. The plateaux, which slope abruptly to the Kagera valley, are without any trees, but everywhere covered with grass. A little south of the spot where the expedition crossed the Kagera, the sources of this river, the Akenyaru and Ruvuvu, unite. Count Götzen considers it most improbable that the Ravuvu is the principal source-river of the Kagera, for the quantity of water above and below the mouth of the Ruvuvu differs very little, and he describes another tributary of the upper Kagera, the Nyavarongo, as even more important than the Akenyaru and Ruvuvu. A lake seems to exist at the spot where the Nyavarongo and the Akenyaru unite, and Count Götzen is inclined to regard it as Stanley's Akenyaru lake.

The plateaux of Ruanda have an average altitude of 5500 to 6500 feet. Its highest points lie in the western districts, where altitudes up to 9800 feet occur, and immediately afterwards the plateaux slope abruptly to the gigantic trough in which the lakes Tanganyika, Kivu, and Albert Edward are situated. The Kivu lake (alt. 4900 feet), which was discovered by the expedition, forms the highest part of this trough, the altitude of the Albert Edward lake being only 3150 feet, and that of the Tanganyika 2660 feet. North of the Kivu lake rise the interesting Virunga mountains, which form an isolated volcanic group, without any connection whatever with the walls of the trough. This mountain group divides the trough into a northern and a southern half.

Without encountering any difficulties, the expedition entered Kisaka, and was well received by the population. This eastern province of Ruanda is a beautiful and very fertile country, well adapted for agriculture and cattle-rearing. There are no villages in Ruanda, but only single houses and farms. A remarkable feature is the total absence of wood, grass being commonly used as fuel. The agricultural population of Ruanda are a Bantu tribe, related to the Warundi; but the reigning race are the Wahuma, or Watusi, who immigrated into the


Congo R.
Stanley Falls
Kirundu
Lowa R.
Oso R.
Tupatokiwche
Kawareware
Lowa R.
Bukonga
Bukonga
Kivu
Mirunga Mts.
Uganda
Victoria Lake
Kagera R.
Kagera R.
Usuvi
Urundi
Urangwa
Uskirombo
Machimba
Nyaraga
Mangara L.
Mt. Kilimanjaro
Taveta
Kondoa
Mgera
Pangani
Pemba I.
Usegua
Zanzibar
Bagamoyo
Ugogo
Mafia I.
Congo R.
Pangani
Zanzibar
Natal
Lieut. Count von Götzen's
EXPEDITION
across Africa
1894.
Author's Route.
Scale, 1:10,000,000
100 50 0 100 200
30°
35°
40°
5°
Main Crater of Mt. Kirunga.
Walker & Boutall sc.

country a long time ago, subjugating the Bantu, but adopting their language. The Wahuma are altogether different from the Bantu; they are of light colour and of tall stature. The Wahuma exercise their power by means of a regular military force, specially selected from a tribe called Batwa, in the north-west of the country. These Batwa have, however, nothing whatever to do with the equatorial dwarf tribes of the same name. Accompanied by a son of the Kigeri, the expedition continued their march to the north-west. On the horizon, far to the north, the summits of the Virunga volcanoes became visible, and in the night of May 26 the bright redness of the horizon indicated the vicinity of an active volcano. Luabugiri, true to the habits of his nomadic race, never resides longer than about two months at the same place. His residence, at the time when the expedition reached him, consisted only of a number of huts inhabited by about two hundred followers of the king. It was situated high above the clouds, in an altitude of 9800 feet. Luabugiri and his followers are described by Count Götzen as the tallest Africans whom he had ever seen, they being at the same time strong and well-proportioned. They were fantastically clothed in tanned goat-skins, richly ornamented with beads of various colours. Luabugiri was wearing a wreath of green leaves, and looked like a Roman emperor.

Under enormous difficulties, the expedition managed to reach the plain at the bottom of the great trough. Dense bamboo forests, impenetrable to the rays of the sun, cover the slopes of the eastern wall of the trough, the trees reaching heights of 65 feet. With knife and axe a road was cleared with great difficulty. Quite exhausted, they reached the fertile plains of Bugoye, south-east of the Virunga mountains, and preparations were at once commenced to ascend the volcano, called by the natives Kirunga Lchagongo. The ascent was successfully carried out by Count Götzen and Dr. von Prittwitz, who were accompanied by twenty porters. First a plain, completely covered with lava, had to be traversed; then the forest region commenced at the foot of the mountain, and for three and a half days the explorers had to force their way step by step through the dense jungle. A further obstacle was that no water was found in the forest, so that the necessary supply had to be fetched every day from the camp. Finally, the forest region terminated, the upper part of the mountain—which consists of black lava soil—being covered with a low vegetation of Alpine character. After two hours' climbing the crater was reached, the walls of which slope almost perpendicularly towards the centre, and are formed by black rocks with pink veins. The height of the walls is about 1000 feet. The bottom of the crater, which shows a variety of different colours, is quite flat. In the centre are two enormous wells, of as regular shape as if they had been constructed by artificial means, and out of one of them rose an enormous cloud of watery vapour with a

thundering roar. It took the explorers two hours to complete a walk round the edge of the crater.

The soil on the shores of Lake Kivu consists principally of lava, the spots being still easily distinguishable where the fused masses came in contact with the water of the lake. The Kivu lake is about 50 miles long, and from 18 to 25 miles wide. It is studded with picturesque islands, and the shores resemble those of the Italian lakes. Count Götzen circumnavigated the northern half of the lake with four canoes; but the triangulation of the northern shores, which took up much time, prevented him from exploring also the southern half, and from ascertaining the course of the Ruzizi river, which, owing to the difference (more than 2000 feet) of the altitudes between lakes Kivu and Tanganyika, must be a river of many waterfalls and rapids, a conclusion one would hardly arrive at, judging only from its swampy mouth at the northern end of Lake Tanganyika. Here Count Götzen changed his originally projected route, and, instead of turning to the south to Lake Tanganyika, determined to penetrate through the primeval forest before him to the Upper Congo. After climbing the western wall of the great trough, the slopes of which were likewise densely covered with bamboo, the expedition reached the grass-covered plains and hills of the country of Butembo. The names of the Congo and of the Oso lake were completely unknown to the natives, who were, however, acquainted with the name of the river Lowa.

The difficulties which the expedition had to overcome from here to the Congo proved almost superhuman, as the country was deserted by the inhabitants, and consequently almost no food was obtainable; at the same time the expedition had to ascend and descend innumerable hills, interrupted by slopes and valleys. The only food obtainable consisted of occasional bananas, which were sometimes found near the deserted villages. The vestiges of the slave-raids of the Manyema were noticeable everywhere. The hills of Butembo are covered with long grass (10 to 12 feet high), and forests cover the valleys. The soil consists of clay-slate, and the same formation prevails in the Great Forest and on the upper Congo. The country gradually slopes to the west, and in the Bulegga country, west of Butembo, where the Great Forest commences, the rivers are tributaries of the Congo. Count Götzen refutes the assertion which has frequently been made since Stanley's last journey, viz. that the forests of the Aruwimi region are merely gallery forests along the rivers, and fully confirms Stanley's view that a large and uninterrupted primeval forest exists there. Count Götzen's expedition did not march along the river-courses, and yet the forest was found everywhere. The only disillusion was that it proved much less picturesque than described by Stanley.

The march through the forest was terrible, on account of the want of food, and owing to the innumerable swamps which had to be crossed

day after day, and to the insecurity what dangers the next day might bring. But nowhere the majestic grandeur, and the total absence of sunlight, etc., described by Stanley, were noticeable, and Count Götzen is of opinion that it is very unlikely that the Aruwimi forest differs in any essential point from the Lowa forest. Pygmies were not met with.

It is interesting to note that the Watembo and Walegga are people of less than medium height, but the ethnological peculiarities characterizing the dwarfs according to Stanley and Stuhlmann are wanting, and the Watembo and Walegga are no hunting tribes, spears and iron-barbed arrows being entirely unknown to them. A peculiar feature of the Butembo country are its fortified villages, built on the tops of steep hills, and surrounded by fortifications, from which huge stones and blocks of wood are thrown on the heads of the assailants.

Before the expedition reached the Lowa river, they were surprised to find in the forest a large Manyema settlement, named Kaware-ware, inhabited by five thousand men, and surrounded by extensive rice plantations. The chief was friendly, which was probably due to the recent success of the Belgian arms over the Arabs on the Congo. The Lowa is a rapid river with a rocky bed. After having crossed it, they came to Tupalo Kiveke, another Manyema settlement, where they were well received and provided with food. But the worst part of the journey was to follow, viz. between the Oso and the Luvutu rivers (both tributaries of the Lowa). The country had been devastated by the Arab wars, the Manyema settlements were deserted, and the products of the forest were quite insufficient to provide the expedition with food. Starvation was imminent, and a number of porters died by eating poisonous nuts. Arrived at the Luvuto river, their privations were at an end, as banana plantations are plentiful there; and on September 24, 1894, the Congo was reached at Kirundu, where the explorers were well received by the officers of the Congo Free State. Two months and a half later they arrived safely at the mouth of the Congo.

THE "CHALLENGER" PUBLICATIONS.

By HUGH ROBERT MILL, D.Sc.

THE last instalment of the *Challenger* Report has been published, and the record of the work of the greatest scientific voyage ever undertaken is now before us in all the completeness of fifty royal quarto volumes. Even its size commands respect. It is twice as large as the last edition of the *Encyclopædia Britannica*; it contains 29,500 pages of letterpress, illustrated by 3000 plates and maps, and innumerable blocks in the text. When the variety, originality, and permanence of its contents are taken into account, the *Challenger* Report must be acknowledged to be a production worthy of the first maritime nation; a contribution to science

so magnificent that it is beyond praise. There is a special satisfaction in noticing that the cramped typography, poor paper, and crude illustrations which cast a gloom over so many of the productions of the Stationery Office are all absent from this book, which may take its place beside the best memoirs of the United States Geological Survey, and fear nothing from the comparison.

An editorial note to the last volume opportunely summarizes the history of the expedition and its publications. In December, 1872, H.M.S. *Challenger* left England, charged with the scientific exploration of the physical, chemical, geological, and biological conditions of the great ocean basins, under the naval command of Captain George S. Nares, and the scientific direction of Professor Wyville Thomson. Of the civilian scientific staff of six, including the director, only three, Dr. John Murray, Mr. J. Y. Buchanan, and Dr. J. J. Wild, survive. The course of the voyage led to a very complete study of the Atlantic, which was crossed and recrossed many times in different directions. From Cape Town the *Challenger* proceeded to Australia by a southerly course, and had the honour of being the first steam-vessel to cross the Antarctic circle. Turning northward, she threaded the island groups of the western Pacific to Hong Kong and Japan, crossed to the middle of that ocean in 40° N., and came southward nearly on the meridian of 150° W. to 40° S.; then visited Juan Fernandez and Valparaiso, passed through Magellan Straits, and returned along the central line of the Atlantic, reaching England in May, 1876.

Over five hundred deep-sea soundings were made; the deep-sea dredge and trawl were used each time, and specimens of water from different depths, and the deposit on the sea-bed, were obtained in addition to the vast collections of marine animals. Tow-nettings for the collection of surface-living organisms were taken continually, magnetic observations whenever it was possible, and meteorological observations and surface temperatures every two hours. On her return the ship was paid off, and is now, as the tail-piece to the last volume shows, a dismantled hulk. But the voyage has made her name immortal, and the *Challenger* will keep her station with the *Resolution*, *Adventure*, *Beagle*, *Erebus*, *Terror*, and all the other exploring ships which have earned for the British navy a glory greater than can be gained in war.

The land-collections were sent directly to the British Museum, but the specimens of marine life, the samples of sea-water from all the oceans, and the deep-sea deposits were stored in the University of Edinburgh until the *Challenger* Office was opened in that city. Under Sir Wyville Thomson, the general plan of the discussions was provisionally sketched out, and specimens were distributed to specialists; and when Dr. John Murray succeeded to the directorship in 1882, the work was pushed forward with energy and enthusiasm until its completion.

By the enlightened policy of Dr. Murray, the discussions of *Challenger* work are extended to include all other available data of the same kind, down to the time when the Report is completed; and many foreign governments have gladly placed their records and collections at the disposal of the *Challenger* specialists.

The fifty volumes were published as they were finished, in no special order, but they may be classed under six general heads.

I. *The Narrative of the Cruise*, of which vol. i. appeared in 1885, bound in two parts, and containing a full account of the voyage. The work at sea, and pleasure-trips or scientific excursions on land, were fully described, with numerous illustrations; and concise summaries were given of the chief results in each department of science, so far as these had then been worked out. A popular edition of the 'Narrative' ought to be published; it would undoubtedly command a large sale. The second volume of the 'Narrative' was published earlier, in 1882, and consisted of the magnetic results and meteorological log, worked up by the naval officers, together with the first two papers by specialists, Professor Tait describing his experiments on the effect of high pressure on thermometer-bulbs, and Professor Renard treating of the petrology of St. Paul's rocks.

Accompanying the 'Narrative,' a large Mercator chart was published with all known depths of the oceans entered upon it, and the configuration of the crust of the Earth under the water shown by contour-lines for the first time with any approximation to accuracy. The concluding volume of summaries carries in its cover three maps of the world in hemispheres on an equivalent-area projection, displaying the configuration of the Atlantic, Pacific, and Indian Oceans respectively, taking advantage of all deep-sea soundings made up to 1894, and naming the various deep areas and shallow plateaux. The allocation of names may give rise to differences of opinion; a few of the names which have already appeared on American charts seem at least as appropriate as those by which they are displaced.

It is a grand geographical achievement of the *Challenger* expedition that the relief of three-fifths of the Earth's surface has been so far elucidated as to allow general maps to be constructed, and the fact that extensive additions have been made to our knowledge since, while vast gaps still remain, only attests the magnitude of the pioneer work.

II. *Physics and Chemistry* occupy two volumes, published respectively in 1885 and 1889, containing seven important memoirs. The late Professor Dittmar, of Glasgow, made a very thorough chemical study of the water-specimens brought home, and wrote an able monograph, naturally from an exclusively chemical standpoint. The principal facts he deduced were, that while his more exhaustive analyses confirmed in a general way Forchhammer's conclusion that the salts of ocean-water had everywhere the same composition, yet at great depths there was a

decided increase in the amount of lime salts in solution. He also went deeply into the important question of dissolved gases, and arrived at several definite conclusions.

Mr. Buchanan discussed the use of the hydrometer for determining specific gravity, and published the results of thousands of determinations made on the voyage, embodying the general results in a map. Much controversy has taken place as to the accuracy of the hydrometer for work at sea, but it now appears clear that for the purpose of determining comparative salinity it is an instrument of high precision, observations with which, when carefully taken, are deserving of full confidence. Mr. Buchanan's chemical researches on the voyage were most laborious, and he did much to elucidate the formation of sea-ice.

The deep-sea temperature observations of the naval officers, made with the Miller-Casella thermometers at 258 stations, are represented in a series of curves, the compilation of which forms the basis of all modern knowledge of oceanic circulation. As published, these curves simply record observed facts without commentary or theoretical discussion. Their importance cannot be over-estimated, but it was one result of their success that improved methods of observation have been arrived at through them, so that a new expedition must necessarily prove even more fruitful in the collection of data of this class. How much was done by the *Challenger*, and as a direct consequence of the expedition, appears from Mr. Buchanan's lecture to the Royal Geographical Society, "On the Similarities in the Physical Geography of the Great Oceans," published in the *Proceedings* for 1886 (vol. 8, p. 753). The new knowledge obtained formed an epoch in the records of the physical geography of the sea with which no other can be compared.

Further magnetic results by Staff-Commander Creak included a discussion full of suggestiveness, and urgently requiring to be supplemented by new observations in fresh regions, the interest of which was not suspected until the *Challenger* results were elaborated.

Professor Renard discussed with rare lucidity the petrological collections made on oceanic islands, and showed how the relative ages of the various volcanic rocks may be ascertained, and a great stride made towards a history of the order of appearance of the volcanic islands of the globe.

Dr. Alexander Buchan has discussed the circulation of air and water from a study of the *Challenger* temperature and other observations, illustrating his papers by a series of maps, which form a unique physical atlas.

No comment is necessary on Dr. Buchan's discussion of atmospheric conditions, as his paper to the Royal Geographical Society, published in the *Proceedings* for 1891 (vol. 13, p. 137), has made them familiar to Fellows of the Society. The paper on oceanic circulation, however, is newly published as an appendix to the last volume, and it is one

of the absolutely new things which the expedition has produced. There is done for the ocean what is never likely to be done for the air—the plotting of isotherms for planes far removed from the surface. Admiral Wharton has recently called attention in *Nature* to the remarkable constancy of deep-sea temperatures in the same stations at different seasons and in different years. In fact, each temperature-reading below 100 fathoms may be looked on as a true annual mean. Dr. Buchan has gathered all possible data, and has supplemented the work of the *Challenger* by the records of surveying-ships, British and foreign cable-ships, and private exploring-vessels like the yachts of the Prince of Monaco; and he has laid down the results on charts of the ocean in the form of isotherms for the planes of the surface, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1500, 2200 fathoms, and the bottom, supplemented by maps of surface and bottom salinity. The map of surface salinity would be more effective if coloured in a more logical gradation of tints than that adopted, and the isothermal maps would also have been improved by not drawing the isotherms across water shallower than the plane to which they refer. These, however, are trifling points. Dr. Buchan has only carried his discussion as far as strict logical deduction from his data leads him. He has alloyed the purity of the observations with no mixture of hypothesis, and so his treatment of oceanic circulation does not result in the formal statement of a completely worked-out theory. He contents himself with giving a series of static glimpses without taking the farther step which might show these fused into a moving picture. Yet he has demonstrated many facts of great novelty and interest. Beneath the surface, for example, the North Atlantic turns out to be the warmest of all the oceans, and the focus from which the warmth spreads is the Mediterranean Sea, the under-current of hot salt water from which sinks by its superior density amongst the lighter Atlantic water, and carries its warmth on the plane of 800 fathoms southward to the African coast at the tropic of Cancer, westward to the Azores, and northward to the British Islands. Another inevitable inference from the maps is the predominating influence of the trade-winds on the water of the ocean, not on the surface merely, but to considerable depths, so that by far the warmest part of the ocean at 300 fathoms is the great bight between the West Indies and North America, in which the north-east and the south-east trade-winds converge.

The surface of the ocean varies much in temperature, but this variable layer is merely a film resting on the cold mass of water below. At 100 fathoms, the average mean annual water-temperature of the whole ocean is 60·8°; at 200 fathoms, 50°; at 500 fathoms, 40°; at 1000 fathoms, 36·5°; and at 2200 fathoms (which is the average depth of the ocean as a whole), 35·2°. The temperature in the deeper layers is independent of latitude, and seems determined mainly by the cold Antarctic

water creeping northward into all the land-bordered oceans from the great open water-ring of the Southern Ocean, which unites them all.

These maps are the basis of all our knowledge, and will be the touchstone of all our theories of oceanic circulation beneath the surface. They could not have been produced even in rough outline but for the work of the *Challenger;* yet they are incomplete, and fatally so in the vast Southern Ocean approaching the Antarctic circle.

III. *Deep-Sea Deposits.*—This section occupies a single volume, but it contains a new science. Dr. Murray had all along been attracted by the problem of the geology of the floor of the ocean, and after the return of the expedition he continued to collect specimens of deposits from deep and shallow seas, receiving the collections made by surveying and telegraph ships in all oceans. These he examined himself from the point of view of their physical and biological character; conjointly with Professor Renard he studied them mineralogically; while Dr. Gibson, Professor Dittmar, and other chemists made exhaustive analyses of different groups. The result has been to arrive at a simple classification of marine deposits on wide general principles, to map out the distribution of these over the ocean floor with approximate completeness, to discover the mode of origin of the more puzzling classes, and to build up a theory of the growth of organic deposits and the formation of coral islands. This whole subject is purely a product of the *Challenger* expedition, and it has as yet scarcely been rated at its true value by physical geographers, although it is a conspicuous example of the purely geographical ends to which a powerful generalizer can turn the special researches of chemists, mineralogists, and biologists.

Dr. Murray divides marine deposits into three classes: littoral, shallow water, and deep sea. These are of two kinds by origin—terrigenous, or land-derived; and pelagic, or formed in the open oceans. The former class merely edge the shores, the finest river-mud being rarely met with so far as 300 miles from land, and particles so large as to be called sand remain close to the shore-line. From this point of view, the whole ocean beyond the 300-mile belt of "territorial waters" possesses a distinct individuality, invaded by no material of land-origin except the mud and boulders carried by drifting ice, the dust which settles out of the air, and scraps of floating pumice from volcanic eruptions. In the few patches less than 1700 fathoms deep, far from land, the remains of relatively large and delicate shells which lived on the surface abound at the bottom, mixed with innumerable shells of dense, nearly microscopic foraminifera and a little clayey matter, the whole receiving the general name of pteropod ooze, from the characteristic shells of pteropods which occur in it. In deeper water no pteropod or other delicate shells are found, and the calcareous meal of foraminifera, closely resembling softened chalk, is called globigerina ooze, from the particular genus of surface-living organism which occurs

in largest proportion. At greater depths globigerina ooze is found in which the microscopic shells appear much corroded; and finally, in the deeps or areas more than 3000 fathoms below the surface, the deposit is almost free from carbonate of lime, and forms a stiff red clay composed of decomposed volcanic or atmospheric dust, and those constituents of shells which are not readily dissolved by sea-water.

The process of formation has been clearly shown. Over the whole surface the same shell-bearing creatures die in myriads; their bodies fall continuously as a gentle calcareous snow-shower through the water, which slowly dissolves them. The large thin shells vanish first, and only reach the bottom in shallow water; the dense spheres of the pin-head and smaller foraminifera resist longest, and only the insoluble residue reaches the greatest depth. Thus the excess of carbonate of lime dissolved in the deeper layers of the ocean is readily explained. The red clay forms so slowly that particles of metallic dust from exploded meteorites, which are covered up by the surface accumulations everywhere else, form an appreciable proportion of its substance. In places where silicious organisms like sponges and radiolaria are numerous on the surface, their glassy spicules form a considerable ingredient in the red clay, which, when the proportion reaches a certain value, is called radiolarian ooze. Again, in the cool and less saline water of the Southern Ocean, and in other seas where the water is freshened, the microscopic, silica-sheathed, self-moving plants known as diatoms swarm in such vast numbers that the deposit consists in very large degree of their shells. When the proportion reaches one half, it is fitly described as diatom ooze.

The map of distribution of pelagic deposits shows that red clay probably covers about 51,000,000 square miles of the ocean floor, including the greater part of the Pacific and the deeps of all the oceans; globigerina ooze is spread over about 50,000,000 square miles, extending in the Atlantic, Pacific, and Indian Oceans, from the edge of the terrigenous coast border to the margin of the red-clay areas; while diatom ooze occupies a belt encircling the globe in the Southern Ocean, with a total area of about 10,000,000 square miles. These three kinds of deposits are thus believed to spread over a surface twice as extensive as all the land of the earth. The terrigenous deposits occupy an area of about 19,000,000 square miles, and one of the strongest arguments for the existence of an Antarctic continent is the fact that they border the belt of diatom ooze on the southward, wherever it has been crossed.

IV. *Botany* consists of two volumes, the first by Mr. W. B. Hemsley, dealing with the plants of oceanic islands and their affinities; the second describing the diatoms, by Count Castracane degli Antelminelli. The importance of these minute marine plants has been referred to in speaking of pelagic deposits.

V. *Zoology* has certainly obtained the lion's share of the *Challenger* Reports, the description of the collections occupying forty volumes. It would be unsuitable here to enter into any detailed account of the researches occupying these volumes. They are highly special, and each group is worked out by an acknowledged specialist, forming a text-book of permanent value.

VI. *The Summary* of the scientific results, the appearance of which, on March 11, forms the occasion of the present article, is bound in two volumes, and brings the whole work of the expedition into sight. The opening sentence of the preface shows how the unity into which all the activities of the expedition have combined is, in the view of the director, a geographical achievement. Dr. Murray says—

"The literature of the natural sciences during the past few years exhibits, in a remarkable way, the profound influence our fuller knowledge of the deep sea has had on all general conceptions concerning the modifications the surface of the Earth is now undergoing and has undergone in past geological times. This could not well be otherwise. Whenever science is enriched by a large addition of new facts, a change in theoretical views invariably follows. No complete theory of the Earth was possible so long as we were ignorant of the conditions prevailing over the three-fifths of the globe covered by the waters of the ocean. It may fairly be said that since the discoveries of Columbus, Gama, and Magellan in the thirty years from 1492 to 1522, there has been no addition to the knowledge of the surface of our planet that can in any way compare with that acquired by the *Challenger* and other deep-sea expeditions during the past quarter of a century."

In pursuance of the historical suggestions of the preface, the Summary begins with a profound discussion of the history of oceanography from the earliest time—when the pressing problem was the extent of the oceans—down to the present day. This is illustrated by the reproduction of a number of ancient maps, as well as several large new maps showing the routes of the circumnavigators, from Magellan's *Victoria* to Cook, and, in two plates, from Cook to the *Challenger*.

The Summary which follows takes the form of a concise statement of the observations made, and lists of the fauna, at each of the great observing-stations of the cruise, numbered consecutively from I. to VIII., and from 1 to 354. It is succeeded by a discussion of the bathymetrical and geographical distribution of animal-life, in which several far-reaching generalizations are arrived at.

When dredging at great depths, it was found that few individuals of each species were captured compared with the results in shallow water; but, although life was less abundant, no cases were found when even highly organized animals were entirely absent at the greatest depth. Dr. Murray is inclined to dispute the theory that there is a universal fauna of high antiquity spread over the floor of the ocean in all latitudes,

even although the physical conditions are exactly the same. He finds traces of a universal fauna rather at the "mud-line," or zone of depth where the shore-derived sands give place to the finer muds, usually about the depth of 100 fathoms. One of the few hypothetical statements in the *Report* sums up Dr. Murray's view of the history of deep-sea life—

"I am rather inclined to think," he says, "that in Palæozoic times the ocean-basins were not so deep as at the present time; that the ocean then had throughout a nearly uniform high temperature; and that life was then either absent or represented only by bacteria and other low forms in great depths, as appears to be the case at present in the Black Sea. As in the Black Sea now, so also was there, in all likelihood, in Palæozoic times, insufficient oxygen in deep water to support a deep-sea fauna. From many considerations, one is led to suggest that cooling at the poles commenced in early Mesozoic times; that cold water, descending then in polar areas, slowly filled the greater depths, and, by carrying down a more abundant supply of oxygen, life in water deeper than the mud-line became possible. Subsequently migrations gradually took place from the mud-line into deep regions of the ocean basins."

Finally, Dr. Murray records the conclusion he has come to as to the permanence of the great ocean basins, and of the continental areas on which land has been again and again elevated, and again and again submerged.

An index of about 16,000 names of species, and a very copious general index, complete the work, and practically form a key to the whole set of volumes, greatly facilitating reference.

This notice does not pretend to describe the *Challenger* expedition or its work as a whole, but merely to direct attention to the grand accessions to physical geography in which it has resulted. The publications, however, do not represent all the results of the expedition. Dr. Murray and Mr. J. Y. Buchanan have, during the last twenty years, carried out many incidental researches in physical geography suggested by the *Challenger* work, and they have by their example and encouragement led many others in this country to take up researches which, if little spoken of at home, have been fully recognized by foreign geographers. Dr. Murray has received high honours from the Berlin Geographical Society and the Paris Academy of Sciences, and he has acquired for himself abroad a reputation as the founder of a distinctively British school of physical geography.

THE SIXTH INTERNATIONAL GEOGRAPHICAL CONGRESS.

At the fifth meeting of the International Geographical Congress at Berne in 1891, the Royal Geographical Society accepted the responsibility of organizing the sixth meeting in London. Full particulars of the progress of the arrangements for carrying out this resolution may be obtained at the Society's house, 1, Savile Row, where ladies and gentlemen are now being enrolled as members of the Congress. Before mentioning briefly the plans for the forthcoming Congress, it will be of interest to glance at the history of this periodical International Meeting.

In 1869 statues of the great Flemish geographers, Mercator and Ortelius, subscribed for by the people of Belgium, were about to be inaugurated in the towns of Antwerp and Rupelmond, and a general feeling that such an occasion deserved to be celebrated with more than local honour led to the arrangement of an international festival at Antwerp from August 14 to August 22, 1871. After some discussion, the name given to the meeting was "Congrès des Sciences géographiques, cosmographiques, et commerciales," it being understood that the commercial element must be distinctly geographical. The result was eminently successful, many papers of great scientific importance were read, and the advantages of a meeting of geographers of all nations were felt so keenly that a resolution was passed to continue the Congress periodically. At that time, immediately after the Franco-German war, popular interest in geography had revived in a remarkable way in all parts of the continent of Europe. Geographical societies came into existence everywhere, no less than thirty-nine societies being founded in the ten years 1871-80, compared with twenty-two societies existing before that decade. Several University chairs in geography were also established, and the effect on the advance of scientific geography, and on the applications of geography to education, commerce, and national policy, appears everywhere. The second Congress was held at Paris in 1875, under the auspices of the Paris Geographical Society, whose president, M. Ferdinand de Lesseps, presided over it.

The third Congress met at Venice in 1881, and was carried out on a large scale with great ceremony, the King and Queen of Italy being present at the opening ceremonial, while the exhibition of geographical objects organized by the Italian Geographical Society was extensive and of exceptional interest. Complaints were indeed made that the exhibition rather starved the Congress, for many of the most eminent geographers of all nations were engaged at meetings of jurors adjudicating awards, while the sections were listening to and discussing papers.

In 1889 a series of international conferences was held in Paris in connection with the great exhibition of that year, that of geography being afterwards adopted by the Paris Geographical Society as the

Fourth International Geographical Congress. A special feature of that meeting was the presentation of papers epitomizing the geographical work done by the principal nations of Europe during the nineteenth century, many of them accompanied by bibliographies of permanent value.

Berne was the next meeting-place, and there the fifth Congress was held from August 10 to 14, 1891, the short interval being due to the wish of the Berne Geographical Society to combine the Congress with the celebration of the seventh centenary of the foundation of the town. The exhibition was again a very successful feature of the meeting, and was especially rich in cartographical and educational material. It was decided at that meeting that future Congresses should be held at intervals, not closer than three nor wider than five years, and that London should be the next rendezvous.

At previous Congresses state or municipal aid has been freely given, and premises of the most commodious kind have been placed at the disposal of geographers free of charge. No such privileges are obtainable in this country, and everything must depend on private generosity to supplement the grants of the Royal Geographical Society and of a few enlightened City companies, to provide funds adequate to meet the responsibilities of making the Congress worthy of London, of the United Kingdom, and of the British Empire. The subscription of members is fixed at so small a sum (£1 sterling), that the income so derived can scarcely be expected to do more than cover the necessary expenses connected with the rooms for the meetings and exhibition. Accommodation has been obtained in the Imperial Institute, and members of the Congress will receive the privileges of Honorary Fellows of the Institute during the meeting, as well as similar privileges from the Royal Geographical Society and the Royal Colonial Institute.

The experience of the five past Congresses has been useful in showing what features ought to be preserved or developed, as likely to benefit geographical science, and what might profitably be altered. There are no rules to guide the organization of the meetings, the geographical society which undertakes the management being wisely left a free hand in the matter. An attempt will be made to bring all important communications before the Congress as a whole, and to minimize, if not altogether do away with, sectional meetings. Thus the all-round geographer and the eager student will not be sacrificed to the specialist.

The sixth Congress is numbered in continuity with the five meetings referred to above; but since the fifth Congress met at Berne, there have been two great conferences of geographers to celebrate the discovery of America by Columbus, one having been held at Genoa in 1892, the other at Chicago in 1893.

German geographers have for many years held an annual gathering, the Deutsches Geographentag, the twelfth meeting of which takes

place at Bremen at Easter, 1895. The French geographical societies also hold an annual reunion. These assemblages have proved of great interest and value, and it is highly to the credit of the German and French geographers that they have heartily promised co-operation in the International Congress also. A second Italian Geographical Congress is announced as taking place this year; and the meetings of Section E of the British Association form an annual gathering in this country the value and interest of which a long history attests.

The Sixth International Congress, which will be held in London from July 26 to August 3 this year, has received the patronage of the Queen and the Prince of Wales, and will be under the honorary presidency of the King of the Belgians, the Duke of Connaught, and the Duke of York, who has consented to preside at the opening ceremonial. The president is, by the custom of the Congress, the president of the Royal Geographical Society for the time being; and a large number of eminent public men and geographers, both British and foreign, have accepted the positions of vice-presidents and members of an honorary committee. The preliminary work has been carried out by an organizing committee, nominated by the Council of the Royal Geographical Society, with representations from the Royal Scottish Geographical Society, the Education Department, the Imperial Institute, the Royal Colonial Institute, and the Society of Arts. This committee includes Major Leonard Darwin, M.P., *chairman*; Mr. Clements R. Markham, C.B., F.R.S.; Mr. D. W. Freshfield; Mr. H. Seebohm; Right Hon. Sir George Bowen; Colonel Sir Charles W. Wilson, F.R.S.; General J. T. Walker, F.R.S.; Dr. R. N. Cust; Mr. E. Delmar Morgan; Mr. H. J. Mackinder; Mr. Cuthbert E. Peek; Mr. J. Y. Buchanan, F.R.S.; Sir Frederick A. Abel, F.R.S.; Sir Henry Barkly, F.R.S.; Mr. Faithful Begg; General Sir J. F. D. Donelly, and Rev. T. W. Sharpe, with Mr. J. Scott Keltie and Dr. H. R. Mill as secretaries. Smaller committees are charged with special work in administering finances, promoting the exhibition, and organizing the social features of the meeting. In their desire to promote a cordial good feeling amongst all their fellow-members of the Congress, the Organizing Committee has consulted the leading geographers of the principal countries with reference to many of the proposed arrangements, and has received valuable help on many points. An international consultative committee will probably be appointed at an early date.

The work of the sixth Congress will include the discussion of the reports made by committees nominated at Berne: one on Professor Penck's proposed map of the world on the scale of 1 : 1,000,000; the other on the question of an international bibliography of geography. Papers will be received for consideration by the Organizing Committee until the end of April, and in special cases, where the subjects and authors of papers have been already intimated and approved, the

receipt of the papers may be postponed until the end of May. Each paper must be accompanied by an abstract, not more than 1500 words in length, and they may be written in English, French, German, or Italian, all four languages being on a footing of absolute equality in the discussions.

The heads under which contributions may be sent in practically include the whole range of geography. They are: mathematical geography; physical geography, including oceanography and geographical distribution; cartography; exploration; descriptive geography; historical geography; applied geography, including anthropo-geography and commercial geography; and, finally, geography in education. In a later article this programme will be more fully referred to, and the names of those who have promised papers will be published. Meanwhile, it is sufficient to say that an opportunity, such as has never occurred before in this country, will be presented of demonstrating the importance of geography as a science of high precision and vast extent, rich in results of theoretical interest, and of practical value, which affords an unequalled discipline in education when rightly applied.

In all former Congresses the geographical exhibition has been a prominent, sometimes an overshadowing feature. This year the exhibition will be less extensive than usual, but, although small, it will probably be more representative of the best geographical work of all nations than has ever been the case before. The Paris, Berlin, and St. Petersburg Geographical Societies have undertaken to organize the exhibits of their respective countries, thereby ensuring a good selection critically brought together by those best able to form a judgment. Government departments and private individuals from other countries in Europe, Asia, and America, and from most of the large British colonies, have agreed to exhibit; and our country, which has never been adequately represented in the exhibition of a geographical congress before, may at last be expected to play a worthy part. Lord Aberdare, who was one of the representatives of the Royal Geographical Society at the Venice Congress, devoted a considerable part of his presidential address, at the opening of the session 1881–1882, to a criticism of that Congress and exhibition. He deplored the lack of interest taken by the British Government—although the Indian Government supplied a splendid exhibit—and, after citing the opinion of an Italian writer to the effect that, "If the people of Europe wish to see what treasures are contained in England, they must get up an exhibition in London itself, where, from her natural hospitality, and her pride of pre-eminence, England will take care that her collections shall appear in all their completeness, their originality, and their power," he added, "I confess I hope that time may come."* The fulfilment of this hope is dashed with sadness,

* *Proceedings*, R.G.S., vol. iii., 1881, p. 747.

and the loss of Lord Aberdare, Sir Henry Rawlinson, and Sir Edward Bunbury within ten days removes at one sweep three honorary vice-presidents of the Congress, all veterans of British geography whom the geographers of the world would have delighted to honour.

BARON TOLL'S EXPEDITION TO ARCTIC SIBERIA.

A SHORT account of this remarkable expedition has already been given in the *Journal* (May, 1894), on the basis of a communication made by Baron Toll to the St. Petersburg Academy of Sciences in January of that year. In a paper read before the Russian Geographical Society, in April, 1894, but only now published in the last issue of the *Izvestia* (1894, iv.), Baron Toll, after having described his journey in almost the same terms as in the preceding communication, sums up his researches and impressions as follows:—

"In the middle of the region explored flows the majestic Lena. Its right bank is accompanied by the Verkhoyansk range, which, with the exception of two bends, maintains a nearly meridional direction, up to the shores of the Arctic Ocean. Reaching 7000 feet near the sources of the Indighirka, and 5000 feet at the sources of the Yana, it gradually lowers towards the north, spreading out to a greater width, and attaining but 3000 feet in the Khara-ulakh range. Further on, it disappears under the ocean, but some of its spurs reappear above the surface in 73° to 76° N. lat., forming the New Siberia islands, of which the highest spots, in Kotelnyi Island, do not rise above 1500 feet.

"The geological structure of these chains, both on the mainland and the islands, is the same. The same Silurian limestones, and the same Triassic slates, stretch in the same direction, and the same granites rise on the surface. Only about Svyatoi Nos, on the shores of the ocean, do we find a younger formation of eruptive basalts. The left bank of the Lena is formed by a plateau, about 500 feet high on the average, which is formed, in the upper course of the Lena, of Palæozoic rocks, and below Yakutsk, of Mesozoic and partly Tertiary deposits, identical with the coal-bearing deposits which appear in the New Siberia islands. The Mesozoic deposits had been previously explored, as far as the mouth of the Olenek, by Czekanowski. Now we have had the opportunity of exploring them further north, in the delta of the Lena, and from the mouth of the Olenek to that of the Anabar, as well as up this river to the northern limit of the forests, where the Mesozoic deposits are fringed by basalts, which also form the water-parting between the Anabar and the Khatanga. The Mesozoic formations of the Anabar are of great interest. They contain Jurassic and Cretaceous deposits (Oxford and Neocomian), all of them rich in fossils, and the nearer study of the materials I have collected affords answers to several important questions relative to the history of our globe. Thus they give a positive reply to the question

raised by the late Neumayer, as to the existence of several climateric zones during the Jurassic period, and prove that he was right in assuming the existence of a boreal zone of the Jurassic sea round the North Pole. Moreover, the fauna which I have found in the Neocomian deposits permits us now to determine exactly the age of the interesting Mesozoic fossils which had been collected by Fr. Schmidt and Middendorff in boulders only, scattered over North Siberia; they belong to deposits which are widely spread in the Pechora region, and which Payer found on the east coast of Greenland. As to the Jurassic fossils which I have brought back, they settle the exact age of the coal-bearing deposits of Siberia, which contain considerable amounts of fossil wood.

"Post-Tertiary deposits abound in all the valleys of both the plateau and the lowlands. Their most popular representative is the mammoth. It is well known how widely spread mammoth tusks are over North Siberia, and how fabulously numerous they are in the New Siberia islands. And it is also well known that, besides the tusks and the bones of the mammoth, whole skeletons of this animal and of the rhinoceros, as well as of the *Bison friscus* and the *Ovibos moschatus*, are found. But how are we to explain this fact, as also the circumstance that on the New Siberia islands the bones are found in such incredible quantities, and that they are so well preserved that New Siberian tusks often cannot be distinguished from the best ivory?

"In order to answer this question, we must cast a glance on the Post-Tertiary deposits of the Arctic coast. The chief feature of these deposits is, the permanently frozen soil and the layers of underground or buried ice they contain. The largest masses of such buried ice are found on the Great Liakhoff islands, and they have been described some time ago by Dr. Bunge and myself. As to their origin, after my visit to the Liakhoff islands in 1886, I came to the conclusion that these masses, which form the chief solid material of the island, originated during the Glacial period, and that they represent remains of the old ice-cap. But it was asked, Why, if such was the case, have no *roches moutonnées*, striated surfaces, or moraines, and transported boulders been observed? We have now made a further step towards answering the question. In the Bay of Anabar, on the sea-coast in 73° N. lat., I have found a typical moraine; and the bay itself has the shape of a true fjord. Moreover, my studies of the structure of the ice-masses show that they have the typical granulated structure, which fact removes all doubt as to their origin in the snow-covering of the country, as against any other possible aqueous origin. The cliffs of the Great Liakhoff island also proved to be very instructive, as it appeared that the fresh-water sandy clay, which covers the underground layers of ice, contains, together with shells of molluscs (*Cyclas* and *Valvata*), remains of insects, and bones of Post-Tertiary mammals, which prove that this clay belongs to the mammoth bed; also whole trees of alder (*Alnus fruticosa*), willow, and

birch, 15 feet high, and with perfectly well-preserved leaves, and even cones. This fact proves to a certainty that during the Mammoth period, the northern limit of tree-vegetation was situated at least three degrees further north than it is now; it was then under the 74th degree, while now it is on the mainland under the 71st degree. We thus fully understand how the meadows, covered with bushes of birches, willows, and alders, which were then connected with the mainland, could afford sufficient food for mammoths, rhinoceroses, etc.

"We also discover a certain law in the distribution of the masses of buried ice. None of them are found to the west of the mouth of the Yenisei, or to the east of that river as far as the mouth of the Khatanga —that is, in the parts of the coast region which were covered by the Post-Pliocene Arctic Ocean. On the contrary, in the region which rose above this ocean, in the space between Khatanga bay and the New Siberia islands, near the mouths of the Lena, the Yana, etc., we find these ice-masses—these remainders of former glaciation. As to the comparative rarity of moraines, *roches moutonnées*, and so on, we must take into account, not only the very rapid disintegration of rocks under the climate of the north, but also the very powerful "deflation" (activity of wind), and the special character of the erosion which takes place in these regions. The rivers of the far North do not erode deep beds, but they continually oscillate in a horizontal direction, and thus their erosive action is spread over a wide surface. This last fact must also be taken into consideration when we discuss the position of the northern limit of forests. The growth of forests depends not only upon latitude and altitude, but also on drainage, which is here as important for the growth of trees as moisture is in our latitudes."

After some interesting remarks on the dependence of animals upon surrounding nature, and their migrations (the lemmings are said by the Lamutes to display a three years' period in their migrations to the New Siberia islands), Baron Toll spoke of the inhabitants of the Tundras as follows:—

"They entirely depend for their living upon these migrations of animals. In the summer they come with their reindeer herds to the sea-coast, and when the fish arrive they go to the mouths of the rivers; while during the moulting of the birds they assemble around the lakes. In the winter they return to the limit of the forests, where they find protection from the snow-storms, and hunt the arctic fox, or fish in the lakes. But part of them remains in the Tundra all the year round, and these know about growing trees only from hearsay. The collection of mammoth-bones plays also an important part in their lives. They find them everywhere washed out of the shores by the rivers and little streams, or even by the waves of the sea. Every year a party of the more enterprising and daring inhabitants of the mainland repairs to the Great Liakhoff island.

"The manner of life of all the inhabitants of the Arctic coast—Yakuts, Tunguses, Lamuts, and, beginning with the Khatanga bay, the Samoyeds—determines their character. Hunting, and especially the search for mammoth-bones, which depends not only on intelligence, but very much on mere chance, give to their character a certain levity and passion for adventure. Their experience that luck depends on mere hazard, maintains superstition and shamanism. On the other hand, we find among the aborigines of Siberia a proof that constant contact with nature maintains in man the primitive and childishly naive goodness of heart. Moreover, the sternness of the nature which surrounds them convinces them of the importance of friendly mutual relations, and they have, therefore, a standard of morality which is astonishing to us Europeans. Murder does not exist in their code, and it is unimaginable among them. It must, however, be remarked that all aborigines, although christened, have less than even a superficial idea of Christianity.

"It is impossible not to love the aborigines of the Arctic coast, and we especially cannot but remember them with a feeling of gratitude for their hospitality and their universally irreproachable relations with us. Therefore, I am bound to mention their unfavourable surroundings. Since the annexation of Siberia, they have been accustomed to pay the tribute without murmur, to pay even for those of them who died long since, and to receive from the merchants bad goods and spirits at a very high price. It is pitiable to see how brandy is all they receive from those who undertake to teach them higher truth."

After having made the remark that the traveller always succeeds in his task when he has taken for his motto the Yakut saying, "Bir äraiz äölökh," *i.e.* "To die all together in loyalty to one's comrades and one's task," and that this motto, adopted by Nansen, will bring aid and luck to his bold undertaking, Baron Toll concluded as follows: "There remains much work for the geographer in the North, both on the mainland and on the islands, whether already discovered, or only seen at a distance. When my guide, Jergheli, told me of Sannikoff's Land, which I myself have also seen to the north of Kotelnyi Island, and which he, who has spent seven summers on the same island, has seen, from year to year, mysteriously rising in the north, and when I asked him whether he would like to reach that distant goal, he gave me the following answer: 'Only to put my feet upon it, and then to die'!"

THE MONTHLY RECORD.

THE SOCIETY.

A Franklin Commemoration.—The Council have arranged to hold a special meeting of the Society on Monday, May 20, to commemorate the fiftieth anniversary of the departure of the *Erebus* and *Terror*, under Sir John Franklin, on that Arctic expedition from which he and his

gallant men never returned. It is to be hoped that there will be a large gathering of those who have been connected with, or who are interested in, Arctic exploration. H.R.H. the Duke of York has kindly promised to be present. There may be some other special features connected with this commemoration, which will be only announced to the Fellows.

The Annual Conversazione and Dinner.—A conversazione will be held on the evening of the anniversary of the Society, Monday, May 27, at the Prince's Hall, Piccadilly. The anniversary dinner will take place on Wednesday, June 12, at the Whitehall Rooms. Details will be given in the May number of the *Journal*.

The Oxford Geographical Studentship.—The examiners have this year elected Mr. R. S. Günther, of Magdalen College, as the student to whom the Society's Scholarship is to be awarded. Mr. Günther is to investigate the volcanic region of the Phlegræan fields near Naples during the months of July and August, and of December and January next. His work will consist of—1. An investigation of the relation between the catchment areas of the ravines cut in the slopes of certain of the volcanoes and the depth to which the ravines have been eroded. 2. An attempt at the determination of the relative ages of the volcanic slopes by a comparison of the ravines on their flanks. 3. A determination of the volcanic energy of the region as exhibited by the mass of matter which has been erupted over the region.

Mr. Scott Elliot's Expedition to Mount Ruwenzori.—Mr. Scott Elliot, who has just returned from his expedition to Mount Ruwenzori, will give a paper on the results of his journey, at the meeting of the Society, on Monday, April 8. Mr. Scott Elliot from Mount Ruwenzori traversed the almost unknown region between Lake Albert Edward and Lake Tanganyika, and by the latter lake went on to Lake Nyasa, and home by the Zambezi.

The Society's Prizes to Scotch Training College Students.—The following candidates for Queen's scholarships, under the Scottish Education Department, were successful in obtaining the prizes for proficiency in geography, offered by the Society. MALES.—*Prize of* £5: Thomas Neilson, Shotts. *Prizes of Books:* Francis W. Milne, Gamrie; William Young, Stirling; William Scott, Leith. FEMALES.—*Prize of* £5: Jeannie A. B. Black, Aberdeen. *Prizes of Books:* Alice Watson, Aberdeen; Madge Webster, Aberdeen; Mary Barrowman, Glasgow.

EUROPE.

Desiccation of the Caucasus.—The Caucasian Geographical Society has brought out a volume of memoirs (*Zapiski*, vol. xvi.) of more than usual interest. In describing the country and the flora of Stavropol, M. Akinfieff touches upon the now much-discussed question of the cause of the rapid desiccation of Northern Caucasia. The destruction of forests cannot be of great importance, as they have been cut down long since, especially by the Nogais; but it has been shown by the Kuma-Manyoh expedition that the area of the Caspian has decreased during the

last one hundred years by at least 6600 square miles, and what was formerly covered with water is now covered with dry sand, which dries the winds coming from the east. M. Dementieff has himself seen several times during the last ten years, how in two or three days the wind had blown off a layer 5 inches thick of arable soil from the tilled and partially sown cornfields, on areas covering 300 to 500 acres; and in 1884 the Rostoff-Vladikavkaz railway had to be protected by special screens from the black-earth dust which was blown by the winds, and in some places accumulated to the thickness of 2½ feet on the outer side of the screens. Nearly every year the railway has to be protected in the same way. The grass having been removed from the prairies, the dust transported by the wind finds no obstacles to its transport, and immense areas of tilled land are thus denuded of their fertile soil.

The Glaciers of the Caucasus.—The *Zapiski* of the Geographical Society of the Caucasus (vol. 16) contains a detailed description of the glaciers of Svanetia, by N. Zhukoff, accompanied by a map on the scale of 1: 84,000, comprising the great system of glaciers from 60° 28′ to 60° 45′ E. long., and from 41° 58′ 30″ to 42° 13′ 47″ N. lat.: the glacier Tvüber, nearly 7 miles long, which creeps down to the altitude of 6664 feet; the two glaciers Tsanner, of which the largest has a length of 7 miles, and attains the 6838-feet level; and the Adish glacier, which has a length of 5 miles, of which the *névé* occupies 1½ mile, and the ice-fall 1½ mile, and the ice reaches to within 7448 feet above sea-level. The ice-fall is very steep, as it descends in its own length from the altitude of 13,594 feet to 8785 feet. A. V. Pastukhoff describes his journeys to the highest inhabited spots of the Caucasus and his ascent of the Shah-dagh, accompanying his descriptions by four photographs, one of which represents Kurush, the highest inhabited spot of Caucasia, situated at an altitude of 8175 feet. The village Kurush is very interesting. It is situated in 41° 46′ 56″ N. lat., 65° 30′ E. long., on the southern slope of the Shalbuz-dagh, and has no less than 4660 inhabitants. Their chief occupation is, of course, cattle-breeding, and they spend nearly eight months every year with their herds on the winter pasture-grounds; but they also cultivate the soil, and their fields, which are scattered at heights of from 6440 to 8500 feet, are sufficient to supply them with one-half of the cereals they require for food. From Kurush, M. Pastukhoff visited the glaciers of the Kichen-dagh, and ascended the snowclad Shah-dagh, which rises in the north of the main range to the height of 13,962 feet. K. N. Rossikoff's paper on the conditions of the glaciers and lakes of the central parts of the main ridge of the Caucasus contains the data of his measurements, made in 1892. He began, in 1882, to make accurate measurements of the changes which take place in the sizes of several glaciers, and the changes of level in certain Alpine lakes, specially chosen for this purpose. The general result of these investigations is that all glaciers chosen for observation on the northern slope of the so-called Lateral, or Bokovoi, Caucasus range, from the Adai-khokh to the Diklos-mta (Dzana-kort), have been, since 1883–85 till 1892 inclusive, in a phase of decrease. Their lower ends have receded, the thickness of the glaciers has decreased, and the surfaces of the snowfields which feed them have been gradually lowered. The average recession of the snouts of the glaciers has been 51 feet per year, but it varies for different glaciers from 29 to 70 feet. At the same time, the thickness of the snow region has decreased for four glaciers by from 1 to 4 feet per annum. The lakes of the Alpine region, as well as those which lie at the northern foot of the mountains, have also been decreasing during the same period, although in 1892 some of them attained a higher level than before, probably in consequence of quite local causes.

Inland Navigation in Germany.—A very full report by Mr. J. B. Whitehead upon the canals and other inland waterways in Germany, has recently been

issued (Foreign Office, 1894, Miscellaneous Series, No. 345). There are three principal divisions of German inland waterways, viz. the eastern rivers, including the Memel, the Pregel and the Masurian waterways, the Vistula, and the Elbing-Oberland canal; the central rivers, including the Oder, the Klodnitz canal, the Bromberg canal, the Eider canal, the North Sea and Baltic ship canal, and the Elbe; the western rivers, including the Weser, the Ems, the Rhine, and the Upper Danube. The length of these inland waterways is given as follows:—

	Length. Miles.		Length. Miles.
Memel	168	Brought forward	2340
Pregel	271	Elbe	1594
Vistula	433	Weser	597
Oder	1362	Ems	567
Eider canal	106	Rhine	1851
		Danube	417
Carried forward	2340	Total	7366

Of the above, the canals or rivers converted into canals amount to about 1349 miles. The most important new canals are: (1) the Oder-Spree canal (completed); (2) the Ems-Jade canal (nearly completed); (3) the Dortmund-Ems canal (begun in 1891); and (4) the Elbe-Trave canal. The object of the Oder-Spree canal was to supersede the unsatisfactory communication between the two rivers afforded by the Müllrose (Friedrich Wilhelms) canal, and to allow large barges from the Oder to reach Berlin. The canal was completed in 1891. The new canal leaves the Oder at Fürstenberg, 15½ miles above Brieskow, which is the entrance of the Müllrose canal. The whole length of the Oder-Spree canal from Fürstenberg to Cöpenick, near Berlin (where it meets the old waterway), is 60 miles. By means of this new canal the whole distance between Breslau and Berlin has been shortened by about 21 miles. The Ems-Jade canal starts from the port of Emden, and runs in a north-easterly direction past Aurich to Wilhelmshaven, on the Jade gulf. Its total length is about 39 miles. The Dortmund-Ems canal is considered a work of great importance, as affording an outlet for the Westphalian, and later perhaps also for the Rhenish industrial and coal-producing districts to the North Sea, and, by the new ship canal, to the Baltic. The scheme includes a large maritime port at Koenigspolder, near Emden, and a lateral canal from Oldersum to Emden. The total length of the canal will be 148 miles. The Dortmund-Ems canal forms the first section of a projected system of waterways which is intended to connect the Rhine with the Ems, with the lower and middle Weser, and with the Elbe, thus affording, in connection with the existing canals between the Elbe, Oder, and Vistula, a complete line of water-communication from east to west through the centre of Prussia. The Elbe-Trave canal is intended to replace the Steckenitz canal, which at present connects Lübeck with the Elbe. The new canal will in general follow the course of the existing one, leaving the Elbe at Lauenburg, and passing through the Mölln and Ratzeburg lakes. The whole length of the canal will be 43½ miles. The recent improvement of the Prussian waterways has greatly affected the conditions of navigation. The main points are the greater size and carrying capacity of the vessels that can be employed, and the development of steam navigation. The Report contains a map showing the navigable rivers and canals of Northern Germany, on a scale of 1 : 2,000,000.

ASIA.

Mr. Theodore Bent's Journey in Arabia.—The following letter, dated 'Aden, February 13," has been received from Mr. Bent: "We have reached here a

little earlier than we expected, from circumstances which you will see from the following. We spent a good long time in the Gara country behind Dofar, doing the mountains where frankincense comes from very thoroughly, and getting to the borders of the Nejd desert. We found this district exceedingly interesting from several points of view, and as yet entirely unknown to any Europeans. It is exceedingly fertile, and abounds in lakes, streams, and valleys filled with a rich tropical vegetation as different from the Hadramut as anything possibly could be. We found the Beduin tribes here fairly friendly, and had altogether a very good time. We next essayed to get to the Mahri country, but were driven back on two points, and I am convinced that this part of Arabia, under the present state of affairs, is impossible to enter except for a few miles from the coast. We then went on to Sheher, trusting to the promise of assistance there which Iman Sharif had got from the Sultan Nawaajung, whom he saw at Hyderabad. We told them we wished to do the tour they promised to take us last year, when the season was too advanced; but to our surprise they received us very coldly, absolutely refused to let us go outside their town, and told us that for the future no Europeans would be allowed to enter the Hadramut. So I am going to India from here to lay the facts before Col. Holdich. We shall be home about the middle of April, and though we have not done all we wanted to do, yet we are very well satisfied with the piece of Arabia we have done, and the more I see of it the more I am convinced that this portion of Arabia can only be done piecemeal, and a regular journey through from Muskat to Aden is perfectly impracticable."

Dr. Sven Hedin on the Death of M. Dutreuil de Rhins.—In a letter addressed to the *Turkestan Gazette*, and dated "Kashgar, December 21," this Swedish explorer gives some details respecting the death of the French traveller not contained in the letter of his travelling companion, M. Grenard. On December 17, a Cossack who belonged to the expedition, named Razumoff, returned to Kashgar, and as several things in his possession undoubtedly belonged to the French expedition, he was interrogated by the Russian representative at that town. His account is as follows: "We came to Tu-Buda on a rainy day. M. de Rhins, having been refused admittance into the house of one of the inhabitants, ordered us to break open a door which led to a yard, and in this we pitched our tents. Next day we took our horses to a grazing-ground, one verst distant, and two were stolen. Thereupon M. de Rhins ordered us to take two horses by force from the villagers, which we did. When the caravan started, on the third day, it was greeted with threatening shouts, and we had proceeded but a few steps when the inhabitants began firing upon us. M. Dutreuil was wounded in the stomach, and, as he fell he said to me 'Ça ne marche pas.' M. Grenard ran to find the medicine-chest. We were surrounded by some 60 Kalmucks. We were separated from M. Dutreuil, and forced to flee, and I saw him no more." Two natives, who came to Kashgar at the same time, gave different versions. The interpreter, Mohammed Isa, said that the Kalmucks were not to be seen, as they fired from their houses. He took to his horse, and ran away to the next village (Kegudo), "to seek an interpreter there." When he returned in the evening, he found no traces of the caravan. The Kalmucks told him that when the Frenchman was left alone, they put him on a horse, carried him seven miles to the Yang-tse-Kiang, and threw him in, bound hand and foot, throwing stones at him until he sank. They divided his effects among themselves, throwing away all the books, manuscripts, and instruments. No less than 8 *yambs* (about 800 roubles), as well as diamond rings, were found in the possession of these two natives at Kashgar. They also had two excellent horses, so that Isa probably took part in the division of the spoil. The cook of the expedition also gave an account which corroborated the above. Isa also says that M. de Rhins used to pay for provisions

in Khotan gold, which very much dissatisfied the natives. Dr. Sven Hedin considers it his duty to throw, at least, some light on this tragical event, although these accounts are certainly not to be relied upon as true in every particular.

Pastukhoff's Ascent of Ararat.—The new volume of the *Zapiski* of the Caucasian Geographical Society is concluded by a paper by A. V. Pastukhoff on his ascent of Ararat, accompanied by two small maps of the summits of the Great Ararat (scale 1 : 25,200), and of the Little Ararat (1 : 2940). The ascent was begun on August 14, from the Sardar-bulagh encampment, and after having slept one night on a moraine, at an altitude of 13,000 feet, and another night below the summit, at a height of 16,000 feet, MM. Pastukhoff, Ivanovsky, Tamm, and Butyrkin, with five cossacks, reached the eastern summit, having only experienced difficulties in climbing over one rocky ledge, but not without having suffered, some of them, from rarefied air and lassitude. Three pigeons were despatched from the summit (two of them had, however, no desire of leaving the place). The minimum thermometer which had been left in 1888 by M. Markoff on the summit, was easily found, but, the spirit-column having been broken, the conclusions which had been drawn from its indications by previous climbers are of no value whatever. A stone pillar was erected by the party, and good maximum and minimum thermometers were left within it. The whole paper is full of valuable details.

Navigation on the Vilui.—Travelling in Siberia gradually becomes more and more easy. Last summer a steamer, towing a barge, reached the Viluisk, and it took it only four days and a half to cover the whole distance of 670 miles from Yakutsk to Viluisk. The return journey down the river was accomplished in four days. In fact, as had already been proved a few years ago, steamers can ply up the great tributary of the Lena as far as Nyurba and Suntar.

A New Geographical Society.—We are glad to learn that the Amur Geographical Society, a branch of the Russian Geographical Society recently founded at Khabarovsk, on the Amur, has formed a branch named the Transbaikalian Filiation of the Amur Geographical Society, which will have its seat at Chita, in Transbaikalia. The young society, which has the governor of the province, Major-General Matzievsky, for its president, already possesses a museum, formed from the two museums of Nerchinsk and Troitzkosavsk, and containing over 10,000 various exhibits, and a library containing 1207 works. It has already published two pamphlets, one of which is a very valuable review of the climate of West Transbaikalia, as it appears from observations made at seven meteorological stations, founded and maintained by volunteers.

AFRICA.

Means of Transport in East Africa.—Before his untimely death at the hands of a raiding-party on Mount Kilimanjaro, Dr. Lent, who had already accomplished much scientific work in that region, had sent home a valuable paper on the question of transport in the German sphere, which has been published in the *Deutsches Kolonialblatt* (1894, Nos. 22 and 23). Although referring in particular to the special requirements of the region in question, there is so much in the essay that is of general application, that it cannot fail to be of use to all who are interested in the improvement of African communications. It is to be noted that, Dr. Lent's object being the supply of the immediate needs of the country in the most practical way, he does not touch upon the question of railway construction, nor has he in view the requirements of exploring expeditions, so much as the supply of a regular transport service as an aid to the economic development of German East Africa. The subject is dealt with under the two main heads of transport by carts and pack-animals. The feasibility of the former (which is, of course,

to be preferred where practicable) depends principally on the chances of success in the rearing of a suitable breed of oxen, as to which some doubt might arise from the fact of the cattle plague which has so recently raged in the country. There is good reason, however, to believe that this has now completely died out, and, with the checking of the Masai raids, the danger of its recurrence will be minimized. Other conditions, of climate and food-supply, are not unfavourable, and certain localities (*e.g.* the low ground of the Luengera, which joins the Pangani at Korogwe) offer special advantages for breeding purposes. The zebu of India would seem to be the species likely to prove most serviceable. As regards the construction of roads, where moderate distances with a considerable traffic are in question, a fairly large outlay would probably be repaid, and, in view of the difficulty in the construction of a railway between Korogwe and Buiko, a good road (following, however, a different line from the present) is especially needed here. Dr. Lent differs from other writers in favouring the employment of *four-wheeled* carts, though not of the heavy South-African pattern, but rather that of the American farm-carts, which have of late years been exported to South America and Australia. He also deprecates the employment of oxen in pairs, which, he says, hampers the freedom of their movements. On both these points, however, the general practice in India, where the requirements would seem to be very similar, is opposed to his recommendations. Beasts of burden are of special value in that they can dispense with good roads. Dr. Lent discusses separately the advantages offered by each of the six kinds which come into question in East Africa. He does not take a sanguine view of the prospects of the advantageous employment of the elephant, though not on the score of any difficulty in taming the African species. He shows that the opinions which have been lately expressed in Germany as to the value of this animal for transport purposes are much exaggerated, while its power of thriving in damp forest regions, so detrimental to other beasts of burden, is no advantage in East Africa, the predominating steppes of which are rather likely to prove adverse. The expense, as well as difficulty, of providing suitable food, is a point in its disfavour, though for stationary employment in suitable localities it might be useful. The case is very different with the camel. Its successful introduction into Tuscany and North America shows that it is capable of acclimatization, provided that its primary requirements—a dry climate and level ground—are complied with. Such conditions are admirably fulfilled in many parts of East Africa when once the moist coast region is left behind, while the ease with which it finds suitable nourishment gives it a great advantage. The special use of the ox is for draught, and its employment as a beast of burden can only be recommended in the absence of roads. The tropics are not a home for the horse, and even for riding purposes certain breeds of donkeys, or mules, are preferable. The chief objection to the former is their slow pace; but the fact that a good breed (the Wanyamwezi or Masai donkey) already exists in the country, increases its importance. They have already been used with success for transport purposes, and are, at any rate, preferable to native porters. The mule, however, possesses advantages which would make its introduction seem particularly desirable. Its extensive employment in countries which suit it in point of climate—and although, like the camel, it prefers one warm and dry, it is capable of acclimatization to a very high degree—shows its value for purposes of transport, due principally to its strength, patience, and sureness of foot, which last especially fits it for mountainous districts. There can be no doubt that it would thrive in East Africa, while its greater ability to stand variations of climate gives it a higher place than the camel even. Dr. Lent considers that by some such measures as he suggests, the development of the German possessions may be furthered with a comparatively small outlay.

The Sierra Leone Boundary, 1895.—The boundary of Sierra Leone has at length been settled by an Agreement signed at Paris on January 21, 1895. Great Britain might have succeeded at one time in extending her colony of Sierra Leone until it joined that of the Gold Coast. Even the Agreement of August 10, 1889, did not shut her out from the back country, for, whilst assigning Tamisso to France, and the whole of Talla and Sulimania to Great Britain, the boundary terminated at the intersection of the 10th parallel with the 13th meridian to the west of Paris (10° 40′ west of Greenwich), which was at that time believed to lie to the west of the Upper Niger or Tembi-Ko. By an Agreement signed in June, 1891, Great Britain renounced all claims to that river, for it was arranged that the boundary should run along the 10th parallel to within 10 kilometers of the Niger, and then to take a southerly direction to its terminal point of Tembi Kunda. Commissioners were appointed to delimitate the boundary agreed upon on the spot, but differences arose, and they separated without having arrived at any settlement. Negotiations were continued at home, whilst in the field the French sought to fortify their claims

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by actually occupying the country in dispute. Captain Briquelet, in 1893, after having inflicted a serious defeat upon Bilali, one of Samori's lieutenants, established three posts on the upper Niger, namely Farana, Erimankono, and Mafendi Kabaya, and on his march to the coast he left a small garrison at Wossu. In the same year another post was founded by Captain Dargelos at Mara, in Kissidugu, on the Niadian, a tributary of the Niger. Negotiations were opened at the same time with Liberia, and on August 10, 1894, an Agreement was signed which recognizes the upper Cavally, the whole of the basin of the Niger, and everything lying to the north of the parallel of Tembi Kunda as being within the French sphere, whilst fixing upon the meridian of 13° west of Paris as the western limit of Liberia.* In the face of these established facts, the British commissioners charged with the negotiation of a definite agreement, laboured under considerable disadvantages, and

* By an Anglo-Liberian Agreement of November 11, 1887, the boundary of Sierra Leone is formed by the river Manna, and by a line extending from its source in a north-easterly direction.

they were consequently constrained to make large concessions to French claims. Portions of Talla and Kukunia, and nearly the whole of Sulimania were surrendered to the French; the boundary is to follow the watershed of the Niger, which recedes as much as 32 miles from the river, instead of 6 miles as originally agreed upon; and the Franco-Liberian arrangement is to be looked upon as binding. On the other hand, certain very desirable arrangements for facilitating intercourse with the countries lying at the back of Sierra Leone were agreed upon. Frontier customs posts are to be established along the principal caravan routes, and the duties demanded are not to exceed those levied at the coast, nor 7 per cent. *ad val.* in the case of exports. Our sketch-map is reduced from that attached to the Agreement, and lithographed at the Intelligence Division of the War Office. The new work which it embodies is mainly based upon surveys made by Captain Kenney, by whom the positions of thirteen places were fixed by astronomical observations.

Herr O. Neumann's Journey in East Africa.—This German zoologist (*vide ante*, p. 79) had returned in December last to Taveta, near Mount Kilimanjaro, and some additional details respecting his journey are to be found in the *Deutsches Kolonialblatt* (1895, p. 74). His routes north of the Victoria Nyanza led him to Bulamwezi, a northern province of Uganda; while east of the Nile, three days from Wakoli, or Mtanda's, in an attempt to reach Mount Elgon, he came upon a broad and deep stream, which prevented further progress, as the cattle could not be transported across it. This was evidently the upper Mporogomo, which drains the *southern* slopes of the Elgon and flows to the Nile. The Wakenje live on it, in villages built on piles. On the return to Taveta, the usual route was followed over the Mau plateau (where the traveller suffered much from the cold), and past Lakes Nakuro and Naivasha to Machako's. Much difficulty was experienced from swollen streams. The additions made by the traveller to our knowledge of the zoology of East Africa are said to be remarkable.

The Country East of the Victoria Nyanza.—Owing to the death of Dr. G. A. Fischer shortly after his return from his expedition of 1885–86 for the relief of Dr. Junker, the complete geographical results of the journey were not at the time published, a preliminary sketch-map only being given in *Petermann's Mitteilungen* for 1886. The same journal now issues a map on the large scale of 1 : 750,000, embracing the country to the east and north-east of the Victoria Nyanza as far as 37° 40′ E. long., in which the results of the traveller's surveys are laid down, accompanied by extracts from his journals (1895, Nos. 1 and 2). For a considerable portion of the country to the east of the lake, Dr. Fischer is still our only authority (pending the publication of the results of Herr Neumann's journey), and as the map embodies also the surveys of other travellers within the region, its publication cannot fail to be useful. It is compiled by Dr. Bruno Hassenstein.

The Country North of Timbuktu.—Some details respecting the country north and north-east of Timbuktu, derived from information collected by the French military staff (*Comptes Rendus, Paris Geog. Soc.*, 1895, p. 62), add a little to our knowledge of the vast unexplored region east of Lenz's route. On the direct route to Arauan, followed by that traveller, the country is entirely devoid of water, the only variety being imparted by sand-dunes covered with stunted mimosas. A little to the east, however, there are wells at In Alahi and Bu Jebiha, the last a clay-built town like Timbuktu, and this route is therefore to be preferred. Mabruk, to the north-east, can be reached by a slightly circuitous route, abundantly provided with water throughout, and the region traversed is known as *Hessiane*, or "the wells." Although no European has yet made use of this route, the information is

considered reliable, as it was obtained direct from nomads who are constantly traversing the district.

M. Foureau's Journey in the Sahara.—Undeterred by the difficulties encountered on his former journeys (cf. *Journal*, vol. iv. p. 65), this adventurous traveller has this winter renewed his attempt to penetrate southwards through the country of the Azjer Tuareg (*Comptes Rendus, Paris Geog. Soc.*, 1895, p. 45). The furthest point reached (about 27° 30′ S.) was apparently hardly an advance on that of last year, but a considerable extent of new ground was traversed *en route*, and the astronomical and magnetic observations and geological researches are likely to yield good results. The traveller has also brought back numerous photographs.

The Congo Railway.—The *Mouvement Géographique* reproduces (November 5, 1895) a letter written by Père de Hert, a missionary on the Congo, describing a journey on the completed section of the Congo railway, and giving an idea of the further progress made up to July of last year. He speaks with admiration of the difficulties which have been overcome in its construction, and the engineering necessitated by the nature of the country and the effects of the heavy rains of the hot season. At the time of writing trains were running regularly every two days between Matadi and Kenge, the time occupied being from 3 to 3½ hours. The figures given for the month of July, 1894, for this section are: 240 passengers, 139 tons of merchandise, and 15,941 francs receipts. A large-scale map of the line of the railway as far as Kimpesse, and reproductions of photographs showing points of interest on its route, accompany the article.

Sand-dunes and Winds on the South-West African Coast.—A note by H. C. Wilmer, clearly explaining the relation which exists between the sand-dunes on the coast of South-West Africa and the local wind-currents, was read before the South African Philosophical Society so far back as 1889, but has only lately been printed in the *Transactions* of the Society (vol. v. part ii.). Having shown how the strip of desert along the coast, due to absence of rain, itself promotes the conditions which led to its formation by generating during the summer months a south-west wind, which drives back the rain-clouds banked up further to the east, the writer explains the formation of the dunes by the rush of air during the winter months from the colder regions of the interior, to fill the vacuum caused by the rise of heated air from the surface of the desert. This east wind carries with it enormous quantities of sand resulting from the disintegration of the desert surface, which it deposits on the coast in the form of dunes or sandbanks, when it meets the current of colder, denser air from the sea. Under the combined action of the south-westerly and easterly winds, the dunes gradually advance towards the north. They never, however, pass the mouth of the Swakop river, as has been lately remarked by Dr. Dove, as the annual rush of water carries out the accumulating sand into the sea. The Khuisib does not every year send down sufficient water to clear out its bed, and in consequence has, in course of time, shifted its mouth from Sandwich harbour to Walfish bay, a distance of 30 miles, as evinced by the old silt bed, with roots and stems of reeds and footprints of elephants and rhinoceros, which is seen beneath and between the dunes.

AMERICA.

The Geological Antillia.—The position and arrangement of island groups in the seas near continental shores have frequently suggested a resemblance to partially submerged mountain chains. In no case is this resemblance more striking than in the bold seaward curve of the West Indies, running in a row of peaks from North to South America. A recent number of the *Geological Magazine* (No. 364, October, 1894) contains an abstract of a paper read by Dr. J. W. Spencer to the American Geological Society, on the restoration of the Antillean continent. He

founded his argument, not on the mountain peaks, but on the submerged valleys which have been revealed by the careful soundings of the United States surveying-ships in the Gulf of Mexico and Caribbean Sea. The submarine valleys have been grouped into systems, which in all cases connect with the existing land-valleys of the continent. These, in Dr. Spencer's opinion, are the lower ends of river-cañons which cross the coastal slopes and terminate in the bays of the continental mass. These hollows must have originally been as high above sea-level as they now are deep below it, if the author's theory of their origin is to be accepted; and he proceeds to trace out the steps of the subsidence which have carried them down to form the bottom of the Caribbean Sea. The drainage of the ancient Antillean continent must have been, on this theory, almost entirely to the west, there being only two or three long valleys on the eastward side of the Windward mass. The physical changes correspond to and explain the distribution of most of the marine fauna of the locality; but the Sea of Honduras appears to be somewhat intractable, forming an exception to the general theory.

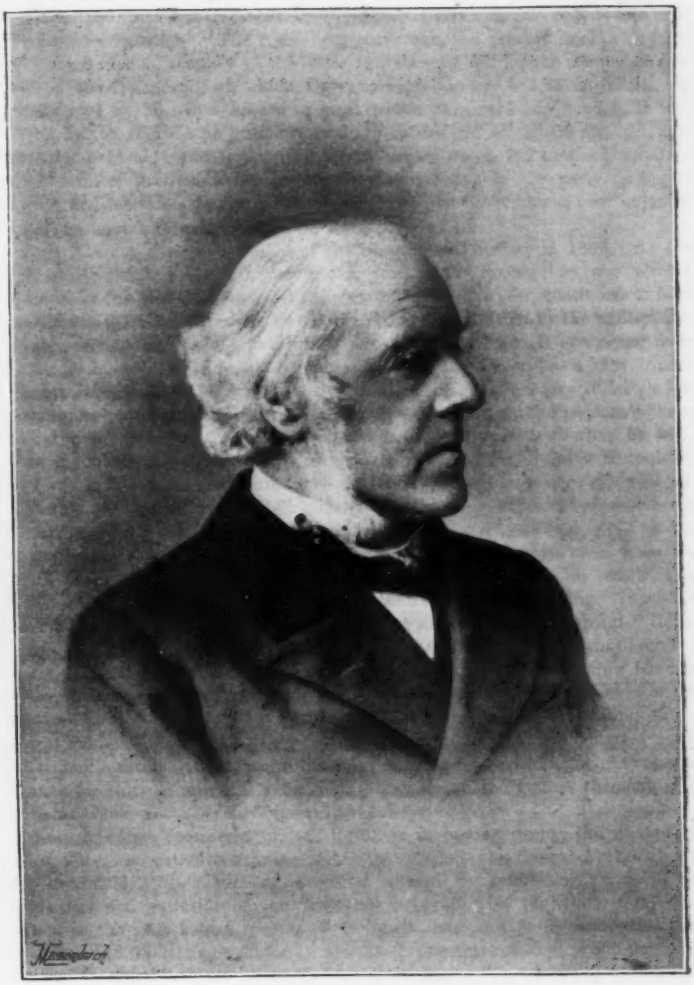
OBITUARY.

Lord Aberdare.

By Sir GEORGE TAUBMAN GOLDIE, K.C.M.G.

HENRY AUSTIN BRUCE was born in 1815, at the commencement of the long peace; and, although the latter half of his life witnessed repeated outbreaks of the international jealousies of Europe, he remained to the end unshaken in the hopes prevalent during his earlier manhood. If fears were expressed before him that France would force a war upon this country, he would say that he had heard that prophecy for seventy years, and if he were spared till it were verified, he believed he might attain double that age. Yet he approved of preserving peace by preparing for war. His strong affection for France dated from his boyhood, when he resided there for six years. It was the period when the Napoleonic legend was at its height; and, encyclopædic as was Lord Aberdare's literary knowledge, I doubt whether, to the last, any publications yielded him more interest than those which threw fresh light on the life of Bonaparte. Biography was, indeed, the favourite mental recreation of his later years.

Mr. Bruce's career in Parliament and the Cabinet is rather a matter for history than for this brief notice. But the loss of his seat for Merthyr, which he had represented from 1852 to 1868, deserves remark. It was mainly due to his uncompromising opposition to the principle of the ballot. His frank and courageous nature was averse from concealment of any kind; and, in common with many of the highest minds of that time, he feared lest a spirit of deception might be encouraged amongst the electors. In the days of restricted suffrage, the use of a vote was generally regarded more as a trust for the community and less as an individual right, than at present. It is characteristic of the rare openness of mind which distinguished Lord Aberdare throughout his life that, at a later date, he became convinced of the necessity—as a protection from popular violence—of the very measure which had cost him his seat. From 1862 to 1868 he had filled in turn the posts of Under-Secretary of State at the Home Office, and Vice-President of the Council. Soon after his defeat at Merthyr he was returned for Renfrewshire, and became Home Secretary until 1873, when he was raised to the peerage, and exchanged his office for that of President of the Council, which he held till the close of his political career in 1874. His only serious mishap, during his long



RIGHT HONOURABLE LORD ABERDARE.
(*From a Photograph by Mayall & Co.*)

tenure of the unthankful office of Home Secretary, was the failure to pass his Licensing Bill, which not a few political opponents have since regretted. Seventeen years later, an elaborate and remarkable tribute to the merits of that measure was paid by the late Lord Randolph Churchill in the House of Commons, on April 29, 1890, and was received with general cheers. I can only quote the following short passage: "The right hon. gentleman, the present Lord Aberdare, when he was Home Secretary as Mr. Bruce, introduced a Bill for the comprehensive reform of the licensing laws, which, I greatly regret to say, led to no result. It was produced by him in a speech of great power, and, curiously enough, it was received by the House with great approval. I am not old enough to recollect, and I have not been able to ascertain, the precise causes which led to the precipitate abandonment of that Bill. But it was abandoned owing to the party feeling of the time, and considerable unpopularity accrued to the Government, very unjustly I think, for having introduced the Bill."

Lord Aberdare became a Fellow of the Geographical Society in 1859. At the Anniversary Meeting of 1880, the jubilee year of the Society, he was elected President for the first time, and, with the exception of one year, continued to hold that office until 1887. Although he was then compelled to retire by the multiplicity of public claims on his energies, which advancing age made it every year more difficult for him to meet, his close connection with the Society, as a joint trustee with Sir John Lubbock, did not cease until his death, on February 25 last, a few weeks before completing his eightieth year. His successor in the President's chair, General Strachey, only expressed the general feeling of the Fellows when he said, in the annual address of 1887, that, with the exception of Sir Roderick Murchison, there was no one of the presidents to whom the Society had been so much indebted.

During his second year of office, Lord Aberdare consented to represent the Society, conjointly with the late Sir Henry Layard and Mr. John Ball, at the International Geographical Congress at Venice—a congenial duty, apart from the service to geography; as Sir Henry Layard, who had taken up his residence in Venice since 1880, was a close friend of more than forty years' standing. It will be remembered that Lord Aberdare's latest literary work was a delightful "Introductory Notice" to the new edition published last Christmas of Sir Henry Layard's 'Early Adventures in Persia, Susiana, and Babylonia.' Lord Aberdare's remarks on the International Congress, made at the opening meeting of the session of the Royal Geographical Society in November, 1881, are especially interesting at the present moment, when the hopes which he then expressed that the Congress would before long meet in London, are on the point of being realized. The weighty reasons he gave for this desire would suffer from abridgement, and I must therefore refer those interested to the *Proceedings* of the Society.

Lord Aberdare considered himself fortunate in having, during the whole term of his office, two active coadjutors as hon. secretaries—the present President and Mr. Freshfield. His tenure of the chair covered the interesting period of the incubation and outbreak of the European occupation of the Dark Continent, which, as the least-known quarter of the globe, has perhaps furnished the most extensive and interesting field for exploration during this century; while the international struggles involved in the "scramble for Africa" aroused a degree of public attention which purely scientific research does not always command. His first evening in the chair (November, 1880) was on the occasion of Mr. Joseph Thomson's paper on the Society's East African Expedition, and during the following seven years Africa was continually in the foreground. As a geographer, he always insisted that knowledge has no nationality, and he terminated his annual address of May, 1882, with some striking remarks on this point, concluding with the

characteristic sentence, "Long may there be Rohlfs, Serpa Pintos, and Nachtigals to dispute the highest honours we can confer with the Gills, Leigh Smiths, and Kirks of our native land."

But outside the walls of the Society, he was not willing that his native land should be outstripped in the work of civilizing a new continent; and, on this ground, he accepted the chair of the Niger Company, which was expressly offered to him as the President of the Geographical Society. His interest in the Niger enterprise did not slacken with advancing years, but grew with his strengthening conviction of the field of usefulness that it opened up. The point of view from which he always regarded it was expressed in a letter written on November 3 last, in which, after speaking of "the truth of Burke's pathetic saying, 'What shadows we are, and what shadows we pursue!'" he added, "and yet not wholly so, if no small part of our pursuit is the good of millions of our fellow-creatures, as I know ours to be."

Lord Aberdare's life-long work in connection with questions of education, other than geographical, was too extensive for detailed notice here, but a brief reference must be made to the foundation of a university for Wales. To his excessive exertions in completing this work, of which he had been the moving spirit, and to his anxious labours as Chairman of the Royal Commission on the Aged Poor, may be attributed the sudden breakdown of his health. He was elected unanimously as the first chancellor of the new university, and his investiture was fixed for the present month. Probably no statesman of this century has taken a leading part in so many and diverse public movements for the advantage and elevation of the human race. Nor was his detestation of injustice and needless suffering displayed only within this limit; for he was, during fifteen years, President of the Society for the Prevention of Cruelty to Animals, and only advancing age compelled him, in 1893, to resign in favour of H.R.H. the Duke of York.

Great intellectual power and moral excellencies command respect, but do not necessarily invite affection. Lord Aberdare's sympathetic and genial nature was irresistible to those with whom he was in frequent contact. He knew not only how to elicit the confidence and affection of the humblest neighbours of his Welsh home, but how to bridge over the wider gulf between age and youth; for his own heart always remained young, and though this is not the place to touch on the subject of his family relations, I may, perhaps, say that he had in perfection *l'art d'être grand père*. With such a rare combination of gifts, it was only natural that his noble life should be crowned with—

> "That which should accompany old age,
> As honour, love, obedience, troops of friends."

CORRESPONDENCE.

The Supposed Discovery of Brazil by the Portuguese in 1447.

THIS subject interests me doubly, as an important question of geographical history, and a fascinating one of historical evidence. May I be allowed to say how it strikes me, on the materials as yet before us?

First, if, on his return from London, Bianco heard at Lisbon that an island which he had hypothetically inserted in his map to the west of Spain, had been found to be authentic, it is very likely that he would make a note to that effect at the bottom of the map. So far I agree with the President. *But Bianco would not have accompanied his note by the drawing of an island.* He could not have been blind to the fact that, by so doing, he would tempt people to think that the island

was where he had drawn it, or at least as near to that place as the want of more room in the map to the southward and westward permitted.

Secondly, Bianco's note appears to tell us that the island is 1500 miles further west than he has drawn it, which is a little to the west of south from Cape Verde, and not very far from that cape. But it must not be assumed that the note excludes his having believed it to be also further south than he had drawn it. If such was his belief, we should expect that, after "distant to the west 1500 miles," he would write, "and to the south so many miles." And it is very likely that he did so, in the line which the President suggests has probably been cut off. But if he did not, his note, though brought to an end by want of space, was, on Mr. Yule Oldham's view, correct as far as it went. On the other hand, if Bianco meant that the island was 1500 miles west of the Strait of Gibraltar, the note as it stands would be so obviously misleading that he could scarcely have failed to extend it over the map by adding two words, "from Gibraltar."

When Herrera's statement, that Columbus in 1498 knew of an affirmation by King John of Portugal that there was a continent to the southward, is added to the above considerations on Bianco's map, it appears to me that the balance of evidence is at present considerably in favour of a Portuguese discovery of Brazil between 1445 and 1448. Galvão's story, with its mention of the Strait of Gibraltar as the point of departure for the unwilling voyage, may or may not refer to the same event. I lay no stress on it.

J. Westlake.

3, Chelsea Embankment, March 5, 1895.

Lake Mweru.

In the Monthly Record of the *Geographical Journal* for November, 1894, I see, under the heading, "A Visit to Mweru," some notes of a recent journey to that lake by Mr. Crawfurd. It is stated by this gentleman that the Luapula river has two mouths into Mweru, and the notes referred to remark that in my map only one is shown, "although earlier maps supposed two divided by Kisi island." The earlier map referred to is, I presume, my own sketch-map, which appeared with the account of my *first* journey to Mweru in 1890. No previous map, that I am aware of, supposed two mouths to the Luapula. The statement that the Luapula had possibly two mouths into Mweru was made by me in 1890, on the strength of native information. On my *second* journey, however, in 1892, I thoroughly explored the lower course of the Luapula, before its entrance into Mweru, and was compelled to show that my previous supposition was wrong. Needless to say, I should not have done this without very careful investigation.

The south shore of Mweru is merely a beach thrown up by the lake, backed by an enormous extent of marshes, through which the Luapula flows in one large clearly defined course. I can state without hesitation that this river has only one mouth into the lake, as I not only coasted along the south shore of the Mweru twice, and both ascended and descended the Luapula by boat, but also explored several large inlets from the lake into these marshes, and found each one to be a *cul-de-sac*. From some of them, however, it is possible to reach the river in native canoes, by pushing them through the marshes, but in a boat I found this to be impossible. Doubtless Mr. Crawfurd has been informed by natives that the inlet he speaks of communicated with the Luapula, and very probably it does so, but it is in no way a *mouth* of the river.

The same notes also mention "five islands" as lying east of the Luapula mouth. The beach I have referred to is broken in several places by inlets, and at its back it

has marshes. To this extent, therefore, one might call these pieces of beach "islands." There is, however, only *one* true island (which can be circumnavigated) in Mweru—*Kilwa*.

The Kilwa chief spoken of as "Shimba," is Simba ("a lion"), one of Abdallah bin Suliman's lieutenants.

"Va Shila" is doubtless a mistake for *Wa-Chilwa* (the people of Chilwa or Kilwa). No people but those of Simba live at the south-west end of Mweru.

Possibly there may be some African language in which "Mweru" means "white," as stated by Mr. Crawfurd; but this is the universal word in Lunda, Itawa, and the adjacent countries, for "lake." It takes the place of the word "nyanja" used further east.

ALFRED SHARPE.

Zomba, British Central Africa, January 15, 1885.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1894-95.

Special Meeting, February 18, 1895.—CLEMENTS R. MARKHAM, ESQ., C.B., F.R.S., President, in the Chair.

The Paper read was:—

"Journey to the Pamirs and the Sources of the Oxus." By the Hon. G. N Curzon, M.P.

Afternoon Technical Meetings. Friday, February 22, 1895.—CLEMENTS R. MARKHAM, ESQ., C.B., F.R.S., President, in the Chair.

1. "A New Cosmosphere." By W. B. Blaikie.

2. "An Instrument for showing the apparent Diurnal Motions of Celestial Bodies." By R. A. Gregory, F.R.A.S.

3. "A Graphic Method for showing the Duration of Daylight." By Lieut. Carlyon Bellairs.

Seventh Ordinary Meeting, February 25, 1895.—CLEMENTS R. MARKHAM, ESQ., C.B., F.R.S., President, in the Chair.

ELECTIONS.—*Alexander Devine; Morgan Ignatius Finucane, M.R.C.S.; Captain H. D. Laffan, R.E.; Gordon W. Miller; Dr. John Murray; C. Guy Pym; Surgeon-Captain J. R. Roberts.*

The Paper read was:—

"British New Guinea." By Sir William Macgregor, K.C.M.G.

The PRESIDENT said: I am sure the Fellows of this Society will hear with very great regret the sad news I have received from Sir Henry Howorth of the death of our old President, Lord Aberdare. He was for five years President of this Society, and filled this chair always with geniality, always with kindness and great ability. For myself I can only say I have to regret a very old friend, for whom I have had a deep regard and esteem. I have to report that the subscriptions are coming in for the International Geographical Congress; that the Fishmongers Company have just sent a subscription of 100 guineas, and the Salters Company have also subscribed. I take this opportunity of announcing that on May 20 we shall have a special meeting to commemorate the fiftieth anniversary of the departure of Sir John Franklin's expedition, which will subsequently be commemorated on June 4 by the

Scottish Geographical Society, that being the day when Sir John left the Orkneys. I would also announce that on the day of the anniversary the Society will hold its *soirée*, which will take place in the Water-Colour Galleries, Piccadilly.

Eighth Ordinary Meeting, March 11, 1895.—CLEMENTS R. MARKHAM, ESQ., C.B., F.R.S., President, in the Chair.

ELECTIONS.—*Major C. McGuire Bate, R.E.; George William Capel; Vice-Admiral Philip Colomb; Captain Charles Crutchley (Leinster Regiment); Samuel Garman; Sir Henry Howorth, K.C.I.E., F.R.S., M.P.; John Grant Langlands; Captain Frederick Eyre Lawrence (Rifle Brigade); Willy Rickmer Rickmers; Arthur Ruddlesden; Samuel Wells; A. F. Willoughby.*

The Paper read was:—

"Three Years' Travelling and Fighting on the Upper Congo." By S. L. Hinde (Captain in the Belgian Service).

DEATH OF SIR HENRY RAWLINSON, LORD ABERDARE, AND SIR E. H. BUNBURY.

The PRESIDENT said: This evening I must open our proceedings by a reference to the heavy losses that the Society has just sustained.

In Sir Henry Rawlinson and Lord Aberdare our Society has lost two of the best of our Presidents.

Sir Henry received the gold medal fifty-five years ago for exploring Khuzistan, and he had been a Fellow for more than fifty years. While still working in the field of eastern research he sent home valuable papers to us on Khuzistan, on the site of the Atropatenian Ecbatana, and on the comparative geography of Afghanistan, for even in the midst of his anxiety as Resident at Kandahar, during the first Afghan war, he did not forget the interests of our Society.

He returned to England a ripe geographical scholar, renowned for his Assyrian researches, and as the discoverer of the Behistun Inscription, which may be considered almost as much a geographical as a historical inscription. Sir Henry came on our Council in 1850, and continued on it almost without intermission until 1893. During the long period that Sir Roderick Murchison was President, we received several papers from Sir Henry Rawlinson on subjects connected with Persia and Central Asia. He was a constant attendant at our meetings, and a very active member of our Council. He frequently joined in discussions on the subjects with which he was best acquainted, and sometimes he enchained the attention of his audience by pouring out fresh geographical illustrations from the depths of his great learning, clothed in all the charms of a clear voice and a good delivery.

I remember that during Sir Roderick Murchison's long illness he several times said to me that Sir Henry Rawlinson should take his place, and that he considered him to be the most suitable man for his successor, and I assured him of my conviction that all the Fellows of the Society were unanimously of the same opinion.

As our President, Sir Henry Rawlinson did honour to this chair by his great knowledge of eastern geography, and his unequalled acquaintance with the historical geography of Persia and Central Asia. He presided with great ability and never-failing tact; while his charming receptions and the hospitalities of Sir Henry and Lady Rawlinson in Charles Street will never be forgotten by those who enjoyed them.

Of late years advancing age has obliged him to absent himself from his accustomed place in this hall. He has been much missed, and more than once I have publicly expressed my regret at his enforced absence. The very last time I saw him, however, he told me that he hoped to be able to be with us when the

weather was warmer. This can never be now. He passed away full of years and of well-deserved honours, and regretted by none more than by his old geographical friends.

The death of Lord Aberdare has also been a source of deep regret among Fellows of the Society. He was an admirable President, taking a deep interest in the work, and always courteous, genial, and warm-hearted. We have to thank my old friend and master, Lord Northbrook, for having suggested Lord Aberdare to preside over us, and for having persuaded him to accept the nomination. For Lord Aberdare felt diffidence respecting his fitness, although, as all well know, he certainly had no cause for any such feeling. I cannot resist reading an extract of a private letter from Lord Aberdare, in which he says, "My connection with the Society has been to me one of unmixed pleasure, and everything has been done, by no one more than yourself, to make it so. But one and all have done their best to enable me to perform the duties of the office as well as one not a master of geography could hope to do."

It is a great pleasure now to be able to reflect that Lord Aberdare retired with this kindly feeling towards us all. He certainly left behind him a very warm feeling of gratitude for his good services, and of affection for himself.

We also have to regret the loss of Sir Edward Bunbury. He was not often to be seen amongst us of late years; but he was well known to us, and appreciated as the author of one of the most valuable geographical works that has appeared in this country during the century.

Technical Meeting, March 15, 1895.—CLEMENTS R. MARKHAM, ESQ., C.B., F.R.S., President, in the Chair.

The Paper read was:—

"The Palæontological Evidence as to the Age of the Atlantic." By Dr. J. W. Gregory.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

THE following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.	Mag. = Magazine.
Ann. = Annals, Annales, Annalen.	P. = Proceedings.
B. = Bulletin, Bollettino, Boletim.	R. = Royal.
Com. = Commerce, Commercial.	Rev. = Review, Revue, Revista.
C. R. = Comptes Rendus.	S. = Society, Société, Selskab.
Erdk. = Erdkunde.	Sitzb. = Sitzungsbericht.
G. = Geography, Geographie, Geografia.	T. = Transactions.
Ges. = Gesellschaft.	V. = Verein.
I. = Institute, Institution.	Verh. = Verhandlungen.
J. = Journal.	W. = Wissenschaft, and compounds.
M. = Mitteilungen.	Z. = Zeitschrift.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

EUROPE.

Austria—Dalmatia. *Abrégé B.S. Hongroise G.* **23** (1894): 16–20. **Czink.**
Arbe. Isola dalmata nel Quarnero. [By Prof. L. Czink.]

Bay of Biscay—Currents. *B.S.G. Commerc. Bordeaux* **18** (1895): 45–52. **Lagrandval.**

Courants, vents et orages dans la baie de Saint-Jean-de-Luz. Par S. de Lagrandval.

A continuation of the work carried on on the Bay of Biscay by M. Hautreux.

Bruckmann's Guides.

Bruckmann's Illustrated Guides. Munich: A. Bruckmann. London: Asher & Co. Size 7½ × 5. *Maps and Illustrations.*

Nos. 2–5. Venice. By Dr. Gsell Fels. Translated by J. Albert Swallow. 1895. Pp. xiv. and 132. *Price 2s.*

Nos. 7–7a. Como and the Lake of Como. By Fr. Girard. Pp. 64. *Price 9d.*

No. 12. Trento and the neighbouring district. By Prof. Dr. Karl Jülg. Pp. 64. *Price 6d.*

No. 17. Varese and its neighbouring district. By Josef Fischer. Pp. 32. *Price 6d.*

No. 20. San Remo and the neighbouring district. By François Girard. Pp. 38. *Price 6d.*

Nos. 26–27. Nuremberg. Nuremberg: J. P. Raw'sche Book-Shop. Pp. viii. and 62. *Price 1s.*

No. 49. Pisa. By Professor Jens Weile. Pp. 56. *Price 6d.*

Presented by Messrs. Asher & Co.

These guides are well executed, and should prove attractive to tourists.

Corsica. *Alpine J.* **17** (1895): 328–331. **Freshfield.**

Corsica Revisited. A Note by Douglas W. Freshfield.

Corsica. **Richardson.**

Corsica, Notes on a recent visit. With a Map of the Forests and Mines of Corsica. By Ralph Richardson. [Reprinted from the *Scottish Geographical Magazine* for October, 1894.] Size 10 × 6½, pp. [36]. *Presented by the Author.*

Mr. Richardson has supplemented the paper as printed by a set of translations of Corsican ballads and a number of photographs of the parts of Corsica he visited.

France—The Vosges. **Fraipont.**

Les Montagnes de France. Les Vosges. Par G. Fraipont. Paris: H. Laurens [not dated; 1895?]. Size 11½ × 8, pp. xii. and 426. *Illustrations. Price 7s. 6d.*

A charming description of the department of the Vosges, forming a picturesque essay in regional geography.

Greece—Locris. *Z. Ges. Erdk. Berlin* **29** (1894): 409–474. **Skuphos.**

Die zwei grossen Erdbeben in Lokris am 8–20, und 15–27, April, 1894. Von Dr. Theodor G. Skuphos. *With Map and Plates.*

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Astronomy. **Larkin.**

Elliptical Orbits: their distinctive mechanical characteristics and their possible origin. By Henry Larkin. London: T. Fisher Unwin, 1895. Size 8½ × 5½, pp. 16. *Illustrations. Price 1s. Presented by the Author.*

Chronometers. **Gautier.**

Le Service Chronométrique à l'Observatoire de Genève et les concours de réglage de la Classe d'Industrie et de Commerce de la Société des Arts de Genève, avec une étude des épreuves instituées dans d'autres observatoires pour les chronomètres de poche. Par Raoul Gautier. Genève: Imp. Aubert-Schuchardt, 1894. Size 9½ × 6½, pp. xii. and 172. *Presented by the Author.*

Climate and Biological Distribution. *National G. Mag.* **6** (1894): 229–238. **Merriam.**

Laws of Temperature-Control of the Geographic Distribution of Terrestrial Animals and Plants. Annual Address by Vice-president Dr. C. Hart Merriam. *With Maps.*

This will be noticed in the Monthly Record.

Geodesy. **Helmert.**

Bemerkungen zu der Schrift: "Die Erforschung der Intensität der Schwere im Zusammenhange mit der Tektonik der Erdrinde als

Gegenstand gemeinsamer Arbeit der Kulturvölker, von Helmert (Kgl. Ges. d. Wissenschaften zu Göttingen, Juni 1894)." Size 7½ × 4½, pp. 8. *Presented by the Author.*

Geological Experiments. **Reyer.**

Geologische und geographische Experimente. Ausgeführt mit Unterstützung der kaiserlichen Akademie der Wissenschaften von Ed. Reyer. III. Heft.: Rupturen. IV. Heft.: Methoden und Apparate. Leipzig: W. Engelmann, 1894. Size 9 × 6, pp. 32. *Plates. Presented by the Author.*

Professor Reyer here studies the rupture of strata breaking under stress and gives an account of his experiments, with numerous illustrations of the results. He points out that accurate geodetic measurements may detect the changes of surface actually in progress which result from the yielding of strata through accumulating stresses.

Indian Ocean. **Meinardus.**

Beiträge zur Kenntniss der klimatischen Verhältnisse des nordöstlichen Theils des Indischen Ozeans. Inaugural-Dissertation zur Erlangung der Doktorwürde von der Philosophischen Fakultät der Friedrich Wilhelms-Universität in Berlin . . . von Wilhelm Meinardus. Altona, Hammerich & Lesser, 1894. Size 11½ × 9, pp. 48 and xx. *Presented by the Author.*

This thesis is a discussion of a large number of observations collected by German ships in the north-eastern part of the Indian Ocean, but Dr. Meinardus has also consulted other authorities. He has compiled a series of tables showing the relative frequency of wind from sixteen points of the compass, and its average force for each month, as well as numerous other meteorological generalizations.

Land Forms. **Löwl.**

Einige Bemerkungen zu Penck's Morphologie der Erdoberfläche. Von Prof. Dr. Ferdinand Löwl. (Separat-Abdruck aus den Verhandlungen der k. k. geolog. Reichsanstalt, 1894, Nr. 17 u. 18. Wien, 1894. Size 10½ × 7½, pp. [20]. *Presented by the Author.*

A stringent criticism of Penck's work on the morphology of the Earth's surface, especially of the sections dealing with tectonic problems.

Latitude Changes. **Preston.**

On the variation of latitude at Waikiki, near Honolulu, Hawaiian Islands, as determined from observations made in 1891 and 1892 in co-operation with the International Geodetic Association. A report by E. D. Preston. [From the U.S. Coast and Geodetic Survey Report for 1892. Part ii., pp. 53–159.] *With Diagrams.*

Latitude Changes. *B.A. Imp. Sci. St. Petersburg* **35** (1894): 245–256. **Ivanof.**

Sur les lois des variations des latitudes terrestres d'après les observations faites au grand cercle vertical de Poulkovo. Par A. Ivanof.

Latitude Changes. *B.A. Imp. Sci. St. Petersburg* **35** (1894): 545–557. **Nyrén.**

Variations de la latitude de Poulkovo observées au grand cercle verticale dans les années 1882–91. Par M. Nyrén. (Avec deux planches.)

Latitude Changes. *B. A. Imp. Sci. St. Petersburg* **35** (1894): 559–583. **Kostinsky.**

Sur les variations de la latitude de Poulkovo, observées au grand instrument des passages, établi dans le premier vertical. Par S. Kostinsky. (Avec une planche).

The last of these papers deals with observations made since 1890.

Latitude Changes. ——

On the variation of latitude at Rockville, Md., as determined from observations made in 1891 and 1892 in co-operation with the International Geodetic Association. [From the U S. Coast and Geodetic Survey Report for 1892. Part ii., pp. 1–51.] *With Diagrams.*

Latitude Determinations. **Fowler.**

Determination of latitude by observations in the Prime Vertical. By Thomas Walker Fowler, Past President Victorian Institute of Surveyors. Read before the Institute September 28, 1894. Size 8½ × 5½, pp. 8. *Plate. Presented by the Author.*

Latitude Determinations. **Guarducci.**

Sui progressi fatti dalla Astronomia geografica nella determinazione delle latitudini e nelle misure di archi terrestri. Relazione del Dott. Federico Guarducci. Atti del Primo Congresso Geografico Italiano tenuto in Genova, 1892. Vol. ii. part i. Genoa, 1894. Pp. 37–43.

Limnology. *Globus* **67** (1895): 80–84. **Sieger.**

Die Fortschritte der Seenforschung. Von Dr. Robert Sieger. Wien.

A summary of recent limnological work.

Meteorology—Temperature. **Buchanan.**

On Rapid Variations of Atmospheric Temperature, especially during *Föhn*, and the Methods of observing them. By J. Y. Buchanan, F.R.S. [From the *Proceedings of the Royal Society*, vol. 56.] [1894.] Size 8½ × 5½, pp. [20]. *Presented by the Author.*

Meteorology—Temperature. **Mill.**

Temperature of Soil, Water, and Air. By Hugh Robert Mill, D.Sc. Second of a series of six lectures on Meteorology in relation to Hygiene, delivered April 26, 1894. [Excerpt from Part II. of the *Journal of The Sanitary Institute*, vol. xv.] Size 8½ × 5½, pp. [18]. *Presented by the Author.*

Mountains. **Conway.**

Mountain Falls. By W. M. Conway. From the *Contemporary Review*, December, 1894. Size 10½ × 6½, pp. [8].

Nautical Almanac. ———

The American Ephemeris and Nautical Almanac for the year 1897. Washington: Bureau of Equipment, 1894. Size 10½ × 7½, pp. viii. and 534. *Chart.*

Nautical Almanac. ———

The Nautical Almanac and Astronomical Ephemeris for the year 1898, for the Meridian of the Royal Observatory at Greenwich. Also part i. (containing such portions as are essential for Navigation). London: Eyre and Spottiswoode, [1894]. Size 9 × 6, pp. xii., 624, and 17; (part i.) xii. and 306. *Presented by the Lords Commissioners of the Admiralty.*

Oceanography. **D'Albertis.**

Come la navigazione da diporto possa validamente contribuire allo studio della Geografia fisica dei mari e dei laghi. Relazione del Cap. E. A. D'Albertis. Atti del Primo Congresso Geografico Italiano tenuto in Genova, 1892. Vol. ii. part i. Genoa, 1894. Size 10 × 7, pp. 72–92.

Oceanography. **Dickson.**

Report on physical investigations carried out on board H.M.S. *Jackal*, 1893–94. By H. N. Dickson. (From the Annual Report of the Fishery Board for Scotland, 1894.) Size 10 × 6, pp. [48]. *Maps. Presented by the Author.*

This will be noticed elsewhere.

Oceanography. **Dohrn.**

Dei mezzi per promuovere te esplorazioni talassografiche e specialmente della cooperazione che i proprietarî di bastimenti da diporto, le società di canottieri, ecc., potrebbero dare allo studio della Geografia fisica del mare e dei laghi. Relazione del Prof. A. Dohrn. Atti del Primo Congresso Geografico Italiano tenuto in Genova, 1892. Vol. ii. part i. Genoa, 1894. Pp. 93–97.

Oceanography. **Sieger.**

Eine hydrographische Studie Swedenborg's. Von Dr. Robert Sieger, Wien. (Sonderabdruck aus Nachrichten über Geophysik, Bd. i.) Size 9 × 6, pp. 12. *Presented by the Author.*

Oceanography. **Monaco.**

Sur les premières campagnes scientifiques de la "Princesse-Alice." Note du Prince Albert 1er de Monaco. (Extrait des Comptes Rendus de l'Académie des Sciences, vol. 120, Janvier, 1895, pp. 20–24.) Size 11 × 9, pp. 6. *Presented by the Author.*

Oceanography. **Buchanan.**

Sur la densité et l'alcalinité des eaux de l'Atlantique et de la Méditerranée. Par M. J.-Y. Buchanan. (Extrait des Comptes Rendus de l'Académie des Sciences.) Paris: Gauthier-Villars et fils [1893]. Size 11 × 9, pp. 4.

Oceanography—Currents. **Mathiesen.**

Les Courants de la Mer et leur origine. Par le Général Mathiesen. (Extrait de la Revue maritime et coloniale Octobre, 1894.) Paris: L. Baudoin, 1895. Size 10 × 6½, pp. 27. *Presented by the Author.*

Oceanography—Dardanelles. **Magnaghi.**

Di alcune esperienze eseguite negli Stretti dei Dardanelli e del Bosforo per misurarvi le correnti a varie profondità. Comunicazione del Contrammiraglio G. B. Magnaghi. Atti del Primo Congresso Geografico Italiano tenuto in Genova, 1892. Vol. ii. part i. Genoa, 1894. Pp. 440–453. *With Plates.*

Oceanography—Deposits. *C.R.* **119** (1894): 968–970. **Thoulet.**

Les vases marines et leur classification. Par M. J. Thoulet.

The basis of classification proposed is the proportion of clay to sand in the deposits.

Oceanography—Mediterranean. ——

Berichte der Commission für Erforschung des östlichen Mittelmeeres. Dritte Reihe. (Aus den Denkschriften der Kais. Akademie der Wissenschaften in Wien, Bd. lxi.) [Not dated; 1894.] Size 12 × 9½, pp. 116. *Maps and Plates. Presented by the Academy.*

Besides some zoological papers, this volume contains Dr. Natterer's report on the chemistry of the *Pola's* expedition in 1893, and a report on physical observations by Professors Luksch and Wolf, illustrated by bathymetrical charts and temperature sections.

Oceanography—Sea-Temperature. **Mill.**

The Clyde Sea Area. Part III.—Distribution of Temperature. By Hugh Robert Mill. *Trans. R. Soc. Edinburgh*, vol. xxxviii. part i.—(No. 1) —for the Session 1893–94. Edinburgh: R. Grant & Son, 1894. Size 12½ × 9½, pp. 162. *Plates. Price* 30*s. Presented by the Author.*

Illustrated by 32 plates. A summary of the results is published in the *Journal*, vol. iv., 1894, pp. 344–349.

Photographic Surveying. **Paganini.**

Del rilevamento fototopografico. Relazione dell' Ingegnere P. Paganini. Atti del Primo Congresso Geografico Italiano tenuto in Genova, 1892. Vol. ii. part i. Genoa, 1894. Pp. 107–128.

Physical Geography. *Annales G.* **4** (1895): 129–150. **Lapparent.**

Les grandes lignes de la Géographie physique. Par M. A. de Lapparent.

M. de Lapparent enforces the need of more precision and method in the study of physical geography on the lines laid down by Suess, Penck, and Davis; and then devotes the greater part of his address to the consideration of the larger relations of the continents and oceanic depressions.

River-terraces. *P. Boston S. Natural History* **26** (1894): 257–273. **Dodge.**

The Geographical Development of Alluvial River-terraces. By R. E. Dodge.

Soil and Termites. *M.G. Ges. Wien* **37** (1894): 711–725. **Lenz.**

Ueber die Bedeutung der Termiten für Erdbewegung und natürliche Bodencultur in den Tropenländern. Von Oskar Lenz.

Also a separate copy presented by the Author.

Mr. Lenz treats of the earth-moving power of termites as analogous in its effects to the result of the action of worms investigated by Darwin; but he seems to have overlooked the fact that Livingstone had described the termites' tilling of the soil and stated its economic importance long before Darwin's admirable observations on the earthworm had appeared.

Soils. **Shaler.**

The Origin and Nature of Soils. By Nathaniel Southgate Shaler. In the Twelfth Annual Report of the United States Geological Survey, 1890–91. Part I.—Geology. Washington: Government Printing Office, 1891. Size 11½ × 8, pp. 213–345. *Illustrations.*

An excellent chapter of physical geography dealing with the character and formation of different classes of soils, first in their geological nature, as originating from cliff-talus, glacial action, etc., then as affected by plant and animal life. Certain peculiar soil-conditions are noticed as occurring in swamps, marine marshes, prairies, etc.; and the memoir concludes with a discussion of the action and reaction of man and the soil.

Surveying. **Talbot.**

A Description of the Method of Executing Rapid or Reconnaissance Triangulation, drawn up in the Intelligence Division, War Office. By Major Hon. M. G. Talbot, R.E. London, 1894. Size 5 × 4½, pp. 8. *Presented by the Director of the Intelligence Division.*

Surveying. *B.S.G. Paris* **15** (1894): 228–262. **Caron.**

Instructions pour les Voyageurs. Par E. Caron, Lieutenant de Vaisseau.

Instructions for fixing latitude and longitude astronomically, and making a general survey of the route traversed between the fixed points.

Time-Standards. **Ricchieri.**

L'Italia e l'unificazione mondiale del tempo col sistema dei fusi orarî. Memoria del Dott. Giuseppe Ricchieri. Atti del Primo Congresso Geografico Italiano tenuto in Genova, 1892. Vol. ii. part i. Genoa, 1894. Pp. 50–71.

Underground Temperature. *C.R.* **118** (1894): 1164–1167. **Rolland.**

Sur l'accroissement de température des couches terrestres avec la profondeur dans le bas Sahara algérien. Note de M. Georges Rolland.

As a result of many borings for artesian wells in the Sahara, the author concludes that between latitudes 35° and 30° the temperature of the Earth's crust increases at least at the rate of 1° Fahr. in 37 feet, and sometimes more rapidly.

Wind on Mountains. *Le Globe* **33** (1894): 105–133. **Chaix.**

Theorie des Brises de Montagne. Par M. le Prof. Émile Chaix.

Professor Chaix states the two theories of the origin of the diurnal and nocturnal winds of mountain slopes by direct and indirect heating, and points out the importance of more minute observations of the phenomena in order to decide which is more probably correct.

GENERAL.

Anglo-Saxon Unity. **Milne.**

The Federation of the English-speaking people. A talk with Sir George Grey. By James Milne. From the *Contemporary Review*, August, 1894.

Anthropology. **Brinton.**

Nagualism. A Study in Native American Folk-lore and History. By Daniel G. Brinton, Philadelphia, 1894. Size 9½ × 6, pp. 66. *Presented by Francis Parry, Esq.*

Anthropology. **Brinton.**

Reprints of four papers by Daniel G. Brinton, on Anthropological Subjects. *Presented by Francis Parry, Esq.*

These papers are "On the words 'Anahuac' and 'Nahuatl;'" "The Taki, the Svastika, and the Cross in America;" "Characteristics of American Languages;" "A vocabulary of the Nanticoke district," and are reprinted from various journals.

Anthropology.

Eight Anthropological pamphlets (mainly American). *Presented by Francis Parry, Esq.*

These pamphlets deal with various primitive rites, games, and objects of art characteristic of the American races, and are written by Mr. J. Walter Fewkes, Mr. A. M. Stephen, Mr. A. E. Douglass, Mrs. Z. Nuttall, Mr. J. G. Bourke, and Mr. Stewart Culin.

Baltic Fleet. **Don.**

Reminiscences of the Baltic Fleet of 1855. By Deputy Surgeon-General William Gerard Don, M.D. Privately Printed, 1894. Size 6½ × 4½, pp. 138. *Illustrations. Presented by the Author.*

Dr. Don was one of the third-year medical students to whom temporary commissions as assistant-surgeons were granted during the operations of the Baltic Fleet in 1855, and after forty years he has printed an interesting extract from his log, with illustrations of the Baltic fortresses. There is a vivid account of the bombardment of Sveaborg.

Bibliography—Oriental. **Scherman.**

Orientalische Bibliographie begründet von August Müller. . . . Bearbeitet von Dr. Lucian Scherman, herausgegeben von Dr. Ernst Kuhn. VIII. Jahrgang. Erstes Halbjahrsheft. Berlin: Reuther & Reichard, 1895. Size 9 × 6, pp. 136.

Biographical Dictionary. **Lee.**

Dictionary of National Biography. Edited by Sidney Lee. Vol. xl. Myllar—Nicholls. London: Smith, Elder & Co., 1894. Size 10 × 7, pp. vi. and 452. *Price* 15*s.*

The following names, more or less of geographical interest, appear among the notices in the present volume: Robert Cornelis Napier (Lord Napier of Magdala), by Colonel R. H. Vetch; Walter Neale, by Gordon Goodwin; and Thomas John Newbold, by W. A. S. Hewins.

Biographical Dictionary. **Lee.**

Dictionary of National Biography Edited by Sidney Lee. Vol. xli. Nichols—O'Dugan. London: Smith, Elder & Co., 1895. Size 10 × 7, pp. vi. and 456. *Price* 15*s.*

The following names of geographical interest and importance appear among the notices in the present volume: Frederick Lewis Norden, by Warwick Wroth; Robert Norris, by the late H. Manners Chichester; and Francis Oates, by G. C. Bourne.

Biography—Brugsch. *Deutsche Rundschau G.* 17 (1894): 136–139. **Wolkenhauer.**

Heinrich Brugsch. Von W. Wolkenhauer. *With Portrait.*

Biography—D'Entrecasteaux. *B.S.G. Paris* (1894): 263–402. **Hulot.**

D'Entrecasteaux, 1737–1793. Par le baron Hulot. *With Portraits and Map.*

M. de Hulot here publishes the first complete biography of the famous French navigator d'Entrecasteaux, all previous writers having contented themselves with giving an account of his last great voyage in search of Lapérouse. The memoir is illustrated by portraits, and has a short bibliography.

Biography—Frere. **Martineau.**

The Life and Correspondence of Sir Bartle Frere, Bart., G.C.B., F.R.S., etc. By John Martineau. 2 vols. London: John Murray, 1895. Size 9 × 6, pp. (vol. i.) xi. and 516; (vol. ii.) vii. and 469. *Maps, Portraits, and Illustrations. Price* 32*s. Presented by the Publisher.*
Another copy presented by Lady Frere.

This biography will receive special notice.

Biography—Leichardt. *Deutsche Rundschau G.* 7 (1895): 193–203. **Wilke.**

J. W. Ludwig Leichhardt. Von Karl Wilke.

Biography—Mercator. **Dinse.**

Zum Gedächtnis Gerhard Mercator's. Vortrag gehalten in der Gesellschaft für Erdkunde zu Berlin am 8 December 1894, von Dr. Paul Dinse. Sonderabdruck aus den Verhandlungen der Gesellschaft für Erdkunde zu Berlin, 1894. No. 10, Berlin, 1894. Size 9 × 6, pp. 18. *Presented by the Author.*

Biography—Novara. *B. S. G. Italiana* (3) 7 (1894): 101–121; 825–839. **Borsari.**

Domenico Maria Novara. Memoria postuma del Prof. Ferdinando Borsari.

Biography—Ramsay. **Geikie.**

Memoir of Sir Andrew Crombie Ramsay. By Sir Archibald Geikie. London: Macmillan & Co., 1895. Size 9½ × 6, pp. xii. and 398. *Portraits. Price* 12*s.* 6*d. Presented by the Publishers.*

An admirable memoir, which in the compass of one short volume presents in miniature the personality of one of the pioneers of British physical geography as well as of geology; and gives concurrently a brief history of the growth and work of the Geological Survey. An interesting feature of the book is the inclusion of a series of portraits of Sir Andrew Ramsay's contemporaries and colleagues.

British Association Report.

Report of the Sixty-fourth Meeting of the British Association for the Advancement of Science, held at Oxford in August, 1894. London: John Murray. 1894. Size 9 × 6, pp. cviii., 852, and 118. *Plates. Presented by the Association.*

Colonial Expansion. *J. R. Colonial I.* **26** (1894-95): 7-33. **Shaw.**

"Colonial Expansion." By Miss Flora L. Shaw.

Columbus. *National G.M.* **6** (1894): 179-192. **Redway.**

The First Landfall of Columbus. By J. W. Redway. *With Maps.*

Mr. Redway claims to adduce material evidence that the first landfall of Columbus was not Watling Island, but Samané. He suggests that previous historians have paid too little attention to early maps.

Columbus Documents.

Raccolta di Documenti e Studi pubblicati dalla R. Commissione Colombiana pel Quarto Centenario dalla Scoperta dell' America. Parte v.—vol. i.; Parte ii.—vol. ii.; Parte v.—vol. iii. Rome, 1894. Size 16 × 11½. *Plates.*

Commercial Geography. **Mulhall.**

The Carrying Trade of the World. By Michael G. Mulhall. *Contemporary Review*, December, 1894. Size 10 × 6½, pp. 10.

Commercial Geography.

Commercial, No 7 (1894). Index to Reports of Her Majesty's Diplomatic and Consular Representatives abroad on Trade and Subjects of General Interest. With Appendix. 1886-1894. London: Eyre and Spottiswoode, 1894. Size 9½ × 6, pp. 464. *Price* 1s. 9½*d.*

Commercial Geography—Tea. *J.S. Arts* **43** (1895): 189-205. **Stanton.**

Tea. By A. G. Stanton. With Discussion.

A most interesting chapter in commercial geography, describing the gradual decline and fall of the China tea-trade of Great Britain, the rise of Indian and Ceylon tea in importance, with particulars of the tea-growing districts of India and Ceylon, and statistics of the trade illustrated by diagrams and a map.

Commercial Geography—Silkworms. **Wray.**

Perak Museum Notes, No. 1. On the Experimental Culture of Silkworms in Perak, together with a paper on the Malayan Fish-Poison "Aker Tuba," and a note on a lightning discharge in Taiping. Also a note on the Black Limestone at Kamuning. By L. Wray, jun. Taiping, 1893. Size 9½ × 6½, pp. 30. *Plate and Plan.*

Eastern Europe and Western Asia. **Callan.**

From the Clyde to the Jordan: narrative of a Bicycle Journey By Hugh Callan. London: Blackie & Son, 1895 [1894]. Size 8 × 5½, pp. 312. *Map and Illustrations. Price* 6*s. Presented by the Publishers.*

An unpretending and interesting account, which is pleasant to read, of the journey of an observant bicyclist through France, Switzerland, Tyrol, across the Brenner pass, through the southern Austrian crown-lands, Servia, Bulgaria and Rumelia to Constantinople, thence through Anatolia and over the Taurus to Syria, and finally Jerusalem. For a boy or girl, we can imagine no better stimulant to the study of political geography.

Educational. **Porena.**

Delle vicende e degli ordinamenti dell' insegnamento geografico nelle scuole primarie dalla costituzione del Regno, e proposte dei mezzi per migliorarlo. Relazione del prof. T. Porena. Atti del Primo Congresso Geografico Italiano tenuto in Genova, 1892. Vol. ii. part ii. Genoa, 1894. Pp. 525-537.

Educational. **Langler.**

Langler's Picturesque Geographical Readers. Edited by John R. Langler. First Standard (pp. 120); Second Standard (pp. 128); Third Standard (pp. 184); Fourth Standard (pp. 192). London: W. H. Allen & Co. Size 7 × 4½. *Illustrations. Price respectively* 8*d.*, 10*d.*, 1*s*, 1*s.* 6*d.*

This series is carefully prepared, and compares well with other works of the same class.

Educational—Methods. **Robertson.**

Is the Earth a Planet? A study in Physical and Mathematical Geography. By C. Robertson, M.D. Edinburgh: Printed by St. Giles' Printing Company. Size 7½ × 5, pp. 68. *Illustrations. Presented by the Author.*

This pamphlet is preserved as a curious example of the too-common failure of the usual methods of geographical education to convince an intelligent man of the truth of the fundamental fact that the Earth is a planet.

Educational—Pictures. **Frey.**

Mittelschweiz. Geographisch-Kommerzielle Gesellschaft in Aarau. Ein Bilderregen. Separatabdruck aus dem feuilleton der "Neuen Zürcher Zeitung," vom 29-31 März 1894. Von Adolf Frey. Aarau, 1894. Size 9 × 6½, pp. 15. *Presented by the Author.*

Account of an exhibition of educational pictures held in Aarau in May, 1894.

General Geography. **Scobel.**

Geographisches Handbuch zu Andrees Handatlas mit besonderer Berücksichtigung der politischen, kommerziellen und statistischen Verhältnisse. . . . herausgegeben von A. Scobel. Zweite . . . Auflage. Bielefeld und Leipzig, Velhagen & Klasing, 1895. Size 10 × 6½, pp. x. and 802. *Maps. Presented by the Publishers.*

A revised edition of the recently published companion to Andree's Handatlas.

Geography. *Scottish G. Mag.* **11** (1895): 49–56. **Mill.**

The Geographical Work of the Future. By Hugh Robert Mill. *With Diagrams.*

Also a separate copy, presented by the Author.

One diagram represents the area of the unknown Arctic and Antarctic regions compared with Europe, the other a scheme of the subdivisions of geography.

Harbours. **Shaler.**

The Geological History of Harbors. By Nathaniel Southgate Shaler. Thirteenth Annual Report of the United States Geological Survey, 1891–92. Part II.—Geology. Washington: Government Printing Office, 1893. Size 11½ × 8, pp. 93–209. *Illustrations.*

Professor Shaler classifies natural harbours according to their geological origin through deltas, fjords, moraines, lagoons, craters, etc., and after considering the geological causes which tend to improve or impair harbours, he concludes with a review of the harbours of North America, with special reference to those of the United States. Numerous plans of typical harbours are given, and the whole work is published in the fine style which has given to the memoirs of the United States Geological Survey the character of *editions de luxe.*

Historical. **Coote.**

The Voyage from Lisbon to India, 1505–6, being an Account and Journal by Albericus Vespuccius, translated from the contemporary Flemish, and edited with Prologue and Notes by C. H. Coote. London: B. F. Stevens, 1894. Size 9 × 6, pp. xxvii. and 56. *Price* 15*s.*

This interesting little book contains a facsimile of the old Flemish tract, with an interleaved translation. Only two copies of the original are known, one in the British Museum, the other in America. Mr. Coote asserts that his "text, taken on its own merits, has as good a claim to be admitted into the Vespuccian Canon as the *Epistola* [1504], the *Lettera* [1505], the St. Dié *Cosmographiæ Introductio* [1507], or any edition of the *Mundus Novus* published down to the time of the decease of Vespucci in 1512." Critics may, however, be disposed to question the possibility of Vespucci having made a voyage to India at the date assigned.

Historical—Ancient Egyptian Ideas. **Moktar Pacha.**

La figure de la terre connue des anciens Egyptiens. Relation de M. Mohammed Moktar Pacha. Atti del Primo Congresso Geografico Italiano tenuto in Genova, 1892. Vol. ii. part i. Genoa, 1894. Pp. 44–49.

Historical—Discovery of America. **Nocentini.**

La Scoperta dell' America, attribuita ai Cinesi. Relazione di Lodovico Nocentini. Atti del Primo Congresso Geografico Italiano tenuto in Genova, 1892. Vol. ii. part i. Genoa, 1894. Pp. 312–323.

Historical Geography. **Gallois.**

[Criticism of Mr. Harrisse's 'Discovery of North America,' by L. Gallois.] (Extrait de la *Revue historique*, tome lv., 1894.) Size 10 × 6½, pp. 19. *Presented by the Author.*

Historical Geography. **Pennesi.**

Giuseppe Pennesi: Pietro Martire d'Anghiera e le sue relazioni sulle scoperte oceaniche. Rome, Auspice il Ministero della Pubblica Instruzione, 1894. Size 16 × 12, pp. 110. *Presented by the Author.*

An excerpt from the great work published by the Italian Government in commemoration of the fourth centenary of Columbus' voyage.

Historical Maps. *Rev. G.* **35** (1894): 433–445. **Drapeyron.**

L. Drapeyron: Le premier Atlas national et la Ménippée de Tours (1594). Troisième centenaire.

Historical Maps. **Wagner.**

Die Rekonstruktion der Toscanelli-Karte v. J. 1474 und die Pseudo-Facsimilia des Behaim-Globus v. J. 1492. Vorstudien zur Geschichte der Kartographie, III. Von Hermann Wagner. (Aus den Nachrichten der K. Gesellschaft der Wissenschaften zu Göttingen. Philolog.-historische Klasse, 1894. No. 3.) Size 9½ × 6½, *facsimile*. *Presented by the Author.*

This will be referred to in the Monthly Record.

Hygiene. **Mears.**

The Preservation of Health in the Far East. Hints as to Clothing, Food, and Residence in China. By W. P. Mears. London: Church Missionary Society, 1895. Size 8½ × 5½, pp. 48. *Plans. Presented by the Author.*

Plain practical instructions as to the means of preserving health in China, and the arrangements necessary in building houses for Europeans to occupy.

Indian Ocean—Wrecks. **Creagh.**

Government of India. Finance and Commerce Department. Return of Wrecks and Casualties in Indian Waters for the year 1893, together with a Chart showing the position in which they occurred, and a Diagram showing comparative numbers of the reported maritime casualties, etc., the total tonnage, and the number of lives lost, for the past eighteen years. Prepared by Commander B. P. Creagh, Calcutta, 1894. Size 13 × 8½, pp. 64.

Koran. ——

The Koran, commonly called the Alkoran of Mohammed. Translated into English from the Original Arabic. With explanatory notes taken from the most approved commentators. To which is prefixed a Preliminary Discourse. By George Sale. London: F. Warne & Co. [not dated]. Size 7½ × 5, pp. xv., 145 and 470. *Price* 2*s.*

Lightning. **McAdie.**

U.S. Department of Agriculture, Weather Bureau, Circular of Information: Protection from Lightning. By Alexander McAdie. Washington, 1894. Size 9 × 5, pp. 20. *Plates. Presented by the U.S. Weather Bureau.*

The illustrations show numerous photographs of lightning-flashes, and of damage done by lightning in the United States.

Migrations. **Levasseur.**

Sur l'expansion de la race européenne hors d'Europe depuis la découverte de l'Amérique. Communication de M. E. Levasseur. Atti del Primo Congresso Geografico Italiano tenuto in Genova, 1892. Vol. ii. part ii. Genoa, 1894. Pp. 352–366.

Migrations. **Semenow.**

Le Mouvement colonisateur de la race européenne vers l'Orient. Communication de S. E. M. J. de Semenow. Atti del Primo Congresso Geografico Italiano tenuto in Genova, 1892. Vol. ii. part ii. Genoa, 1894. Pp. 367–381.

Mountaineering. *Z. Deuts. u. Oesterr. Alpenvereins* **25** (1894): 95–176. **Purtscheller.**

Zur Entwickelungsgeschichte des Alpinismus und der alpinen Technik in den Deutschen und Oesterreichischen Alpen. *With Illustrations.* Von L. Purtscheller.

Museum. ———

Field Columbian Museum. Pub. i., vol. i. No. 1. An Historical and Descriptive Account of the Field Columbian Museum. Chicago, December, 1894. Size 9½ × 6½, pp. 90. *Plans and Illustrations. Presented by the Director.*

This museum is designed to perpetuate the World's Columbian Exhibition at Chicago.

Museum Handbook. ———

Guide to the Field Columbian Museum. With Diagrams and Descriptions. Second Edition. Chicago, 1894. Size 7½ × 5, pp. 263. *Presented by the Director of the Museum.*

Navigation—Lighthouses. ———

No. 31. U.S. Hydrographic Office. List of Lights of the World. Vol. II. South and East Coasts of Asia and Africa and the East Indies, including Australia, Tasmania, and New Zealand. Revised and corrected to November 30, 1894. Washington: Government Printing Office, 1894. Size 11½ × 9, pp. 64 and xv. *Presented by the U.S. Hydrographic Office.*

Oriental Life. **Trumbull.**

Studies in Oriental Social Life, and Gleams from the East on the Sacred Page. By H. Clay Trumbull, D.D. London: Hodder and Stoughton, 1895. Size 8½ × 6, pp. xviii. and 438. *Illustrations. Price* 6*s. Presented by the Publishers.*

Oriental Literature. **Max Müller.**

The Sacred Books of the East. . . . Edited by F. Max Müller. Vols. xxxv., xxxvi., and xlix. Oxford: the Clarendon Press, 1890–94. Size 9 × 6, pp. (vol. xxxv.) xlix. and 320; (vol. xxxvi.) xxvii. and 388; (vol. xlix.) xiii. and 208. *Presented by the Secretary of State for India.*

Ordnance Survey. *Quarterly Rev.* (1895): 36–60. ———

The Ordnance Survey.

A vindication of the Ordnance Survey from recent criticisms, and a brief summary of the history of surveys of high precision in Europe. The history of the Ordnance Survey, and of the various incidents, accidents, and changes in the production of the various maps, are dealt with in some detail and with an air of authority. An opinion on the value of the hill-shaded one-inch map on p. 49, ascribed to Sir A. Geikie, was, however, really written by Professor James Geikie.

Patents. **Fulton.**

A Practical Treatise on Patents, Trade Marks, and Designs, with a Digest of Colonial and Foreign Patent Laws; the text of the Patents, Designs, and Trade Marks Acts 1883 to 1888 (Consolidated), etc. By David Fulton. London: Jordan & Sons, 1894. Size 9 × 6, pp. xxiv. and 488. *Price* 15*s. Presented by the Publishers.*

This volume includes a general sketch of the patent laws in all countries and British colonies.

Place-Names. **Gambino.**

Sull' Ortografia e l'Ortoepia dei nomi geografici nell' insegnamento e sulle norme per la pubblicazione d'un dizionario di pronunzia geografica secondo il voto del Congresso internazionale di Berna. Comunicazione del Prof. G. Gambino. Atti del Primo Congresso Geografico Italiano tenuto in Genova, 1892. Vol. ii. part ii. Genoa, 1894. Pp. 684–686.

Place-Names. *B. S. Khédiviale G.* **4** S. (1894): 205–231. **Nallino.**

La transcription des noms géographiques arabes, persans et turcs. Par C. A. Nallino.

Arguments in favour of the Khedivial Geographical Society undertaking the compilation of a dictionary of transcriptions of place-names from the Arabic, Persian, and Turkish, in the Roman alphabet. The author proposes two rules: (1) to reproduce

exactly the Arabic sounds which are recognized as correct by all Arabs; and (2) to bring this transcription into conformity with the rules established by the R.G.S., and by the Geographical Societies of Paris and Rome.

Royal Colonial Institute—Library Catalogue.

Catalogue of the Library of the Royal Colonial Institute. London: published by the Institute, 1895. Size 11 × 7½, pp. clvi. and 544. *Presented by the Royal Colonial Institute.*

This handsome volume contains a subject catalogue of the books and pamphlets in the library of the Colonial Institute, arranged under fourteen heads, subdivided into seventy sections which give a classification of the literature of each colony in a clear manner, and the whole is unified by an alphabetic catalogue under the authors' names, including books, pamphlets, and articles in journals. Much credit is due to the Librarian, Dr. Boosé, for the admirable execution of the work.

Silica. **Wright.**

Native Silica, a treatise upon a series of quartz, rock crystal, chalcedony, agates, and jaspers, as well as other Earthy and Metalliferous Minerals (Economic and Decorative), with a chapter upon the formation of Agates, cutting, polishing, and staining, with a Descriptive Catalogue of the specimens forming the collection of the late Right Hon. the Earl of Derby, K.G., bequeathed by him to the Liverpool Free Museum. By Bryce Wright. London: Wyman & Sons, 1894. Size 9 × 6, pp. viii. and 264. *Presented by the Author.*

Time Standards. **Floquet.**

L'Unification internationale de l'Heure et la division décimale du temps. Rapport de M. Floquet sur deux publications de M. Rey-Pailhade. Nancy: Berger-Levrault & Co., 1894. Size 9 × 5½, pp. 14. *Presented by the Author.*

Tin-mining. **Wray.**

Perak Museum Notes, No. II. Alluvial Tin Prospecting, including tables for checking the accuracy of bore-holes, and for estimating the amount, richness, and value of the ore obtained from them. By L. Wray, jun. Taiping, 1893. Size 9½ × 6½, pp. 114. *Diagram.*

University Calendar—Japan.

Imperial University of Japan. (Tei Koku Daigaku.) The Calendar, 2553–54 (1893–94). Tokio (1894). Size 8 × 5½, pp. iii., 265, and 12. *Plans. Presented by the President of the University.*

Zoopraxography. **Muybridge.**

Descriptive Zoopraxography, or the science of Animal Locomotion made popular. By Eadweard Muybridge, with selected outline tracings reduced from some of the illustrations of 'Animal Locomotion.' An electro-photographic investigation of consecutive phases of animal movements, commenced 1872, completed 1885, and published 1887, under the auspices of the University of Pennsylvania. University of Pennsylvania, 1893. Size 8 × 5½, pp. xii. 44, 34, and 14. *Illustrations and Portrait. Presented by the Author.*

NEW MAPS.

By J. Coles, *Map Curator*, R.G.S.

EUROPE.

Bulgaria. **Herbert.**

Eight maps and plans made to illustrate Mr. W. V. Herbert's book, 'The Defence of Plevna,' 1877. Published by Longmans, Green, & Co., 1895. *Presented by the Author.*

England and Wales. **Ordnance Survey.**

Publications issued since February 8, 1895.

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London—Re-survey (Hornsey Parish), III. **53,** 2; III. **55,** 1; III. **65,** 4, 2*s.* 6*d.* each.

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Stockport (Revised), III., IV., 2*s.* 6*d.* each. Index, 2*d.* This town will be completed in 12 sheets.

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Italy. **Fritzsche.**

Die Verbreitung der Malaria in Italien. Nach der amtlichen Karte reduziert von W. G. Fritzsche. Scale 1: 4,000,000 or 64·7 stat. miles to an inch. Petermann's 'Geographische Mitteilungen,' Jahrgang 1895. Tafel 3. Justus Perthes, Gotha, 1895. *Presented by the Publishers.*

Norway. **Institut Geographique de la Norvége.**

Topografisk kart over kongerit Norge. Scale 1: 100,000 or 1·6 stat. mile to an inch. Sheets:—1D, Mandal; 1. 18, Velfjorden; 2C, Oksö; 9A, Kragerö; 2. 7, Eidfjeld; Æ. 5, Neiden; Æ. 6, Svanvik; Æ. 7, Gravefos. Norges Geologiske Undersögelse. Scale 1: 100,000 or 1·6 stat. mile to an inch. Sheet "Gausdal."—Specialkarte over den Norske Kyst fra Lyngvœr til Strömöerne, B. 46, 1: 50,000, 1894.—Specialkarte over den Norske Kyst fra Justö til ny Hellesund, B. 9, 1: 50,000.—Specialkarte over den Norske Kyst fra ytre Torungen til Lillesand og Justö, 1893, 1: 50,000. *Presented by the Institut Geographique de la Norvége.*

ASIA.

Formosa. **Kirchhoff.**

Karte von Formosa nach den besten Quellen entworfen von Prof. Dr. A. Kirchhoff. Scale 1: 1,600,000 or 25·2 stat. miles to an inch. Petermann's 'Geographische Mitteilungen,' Jahrgang, 1895. Tafel 2. Justus Perthes, Gotha, 1895. *Presented by the Publisher.*

India Government Surveys. **Surveyor-General of India.**

Indian Atlas, 4 miles to an inch. Quarter Sheets: No. 6 N.E., part of district Dera Ismail Khan (Punjab); 15 N.W., parts of districts Bannu, Kohat, and Rawal Pindi (Punjab); 28 S.W., parts of districts Hazara and Rawalpindi (Punjab), and of Kashmir State; 31 S.W., parts of districts Sirsa and Bahawalpur (Native State, Punjab). Bickaneer (Native State, Rajputana Agency); 32 N.E., parts of district Hissar and Loharu, Native State (Punjab) and State of Bickaneer (Rajputana); 42 N.E., parts of districts Shimoga and Chitaldroog (Mysore); 42 S.E., parts of districts Shimoga, Kadur, and Chitaldroog (Mysore) and Dharwar (Bombay); 49 N.W., parts of districts Rohtak, Hissar, Karnal, and Delhi, and of Native States Jind, Dujama, and Loharu (Punjab); 129 S.E., parts of districts Lakhimpur and Sibsagar and of Naga Tribes (Assam).—Sheets: 107, parts of districts Sambalpur, Patna, and Kalahandi (Central Provinces), etc.; 121, districts 24 Parganas, Hooghly, etc. (Bengal).—Bengal Survey, 1 inch to a mile, Portions of Sheets Nos. 166 and 195, district Cuttack, Seasons 1878–79 and 1888-89; No. 196, district Cuttack, Seasons

1878–79 and 1888–89; No. 271 (2nd edit.), district Darjeeling, Jalaiguri, and Purnea, Seasons 1840–47, 1858–59, and 1861–67.—Bombay Survey, 1 inch to a mile, No. 85, parts of Western Rajputana and Palanpur Political Superintendency, Season 1890–91; No. 183, parts of Panch Mahals district and States of Baroda, Chhota Udepur, and Bariya, Seasons 1883–84 and 1890–91; No. 190, parts of district Nasik and of the Dang, Baroda, Bansda, and Dharampor States, Seasons 1879–80, 1882–83, 1884–85, 1886–87; No. 223, parts of districts Nasik and Khandesh, Seasons 1875–76 and 1879–80; No. 272, portions of Belgaum District and Native States under Kolhápur Agency, Season 1891–92.—Punjab Survey, 1 inch to a mile; No. 214, district Ferozepore and Bahawalpur State, Season 1869–70 and 1877–79.—North-West Provinces and Oudh Survey; No. 32, districts Meerut Bulandshahr and Moradabad, Season 1873–74, 1876–77, and 1881–82; No. 98, districts Naini Tal, Bareilly and Kheri, Seasons 1866–68, 1871–72, and 1887–88; No. 146, district Bahraich, Seasons 1865–68.—Hyderabad Survey, 1 inch to 2 miles, Sheet Nos. 204, 205, 214, 215, 222 (on one), Khamamet Circar, Season 1823–24.—Central India and Rajputana Survey, 1 inch to a mile; No. 57, part of Jodhpore State, Seasons 1878–79 and 1890–91.—Lower Burma Survey, 1 inch to a mile, Sheets Nos. 232 and 279 (on one), districts Henzada, Hanthawaddy, Tharrawaddy and Thongwa, Seasons 1882–84 and 1888–89; No. 235, districts Hanthawaddy and Thongwa, Seasons 1880–82 and 1887–90; No. 564; district Mergui, Season 1892–93; No. 572, district Mergui, Season 1891–92; 572A, district Mergui, Season 1891–92.—North-Eastern Frontier, 1 inch to 4 miles; Sheet No. 22 N.W. (3rd edit.); parts of district Lakhimpur (Assam) and of Singpho, Naga Hills and Bor Hkamti Country, Seasons 1876–77, 1884–85 and 1887–88.—Berar, 1 inch to 24 miles, 1894.—District Tippera, Lower Provinces (Bengal), 4 miles to an inch, 1894.—District Ajmere, Rajputana, 8 miles to an inch, 1894.—District Hamirpur, N.W. Provinces and Oudh, 8 miles to an inch, 1894.—District Saharanpur, N.W. Provinces and Oudh, 1894. *Presented by H.M. Secretary of State for India, through the India Office.*

AFRICA.

Madagascar. **Grandidier.**

Madagascar d'après les travaux d'Alfred Grandidier. Scale 1 : 3,000,000 or 47·8 stat. miles to an inch. Paris, Andriveau-Goujon, 1895. *Price* 1*s.*

Transvaal Goldfields. **Stanford.**

Stanford's map of the Transvaal Goldfields, British Zululand. The Delagoa Bay Railway and the routes from Cape Colony and Natal. Scale 1 : 1,000,000 or 15·7 stat. miles to an inch. 1895. E. Stanford, London. *Price* 8*s.*

The title of this map sufficiently indicates the area it embraces. The positions of the goldfields are shown, and an inset, on an enlarged scale, is given of the Witwatersrand Goldfields. All the railways are indicated, and have been brought up to date, and routes from the Cape Colony and Natal to places marked on the map are laid down. As there is no hill-shading on the map, it does not, with the exception of the hydrography, indicate the nature of the country; but in other respects it will be found a useful map for general reference.

GENERAL.

Ancient World. **Miller.**

Mappaemundi. Die ältesten Weltkarten. Herausgegeben und erläutert von Dr. Konrad Miller. II. Heft:—Atlas von 16 Lichtdruck-Tafeln. Jos. Roth'sche Verlagshandlung Stuttgart, 1895. *Price* 5*s. each part.*

This is the second issue of this series, and contains the following facsimile maps:—1, Psalter Karte von London; 2, Beatus Karte 2 (Paris II.); 3, Beatus Karte 3, u. 8, Osma u. Gerona; 4, Beatus Karte 4, Ashburnham; 5, Beatus Karte Valladolid; 6, Beatus Karte 6, Madrid; 7, Beatus Karte 7, London; 8, Beatus Karte 9, Turin; 9, Beatus Karte 10 (Paris, III.), 10 Cottoniana, London; 11, Hieronymus 1, London; 12, Hieronymus 2, London; 13, Heinrich v. Mainz, London; 14, Ranulf Higden 1, London; Ranulf Higden 2, London; 16, Ranulf Higden 5 u. 6, London u. Cambridge. These are all photographic reproductions.

Educational. **Lüddecke.**

Deutscher Schulatlas, Mittelstufe, 71 Karten und 7 Bilder auf 42 Seiten. Von Dr. R. Lüddecke. Justus Perthes, Gotha, 1895. *Price M.* 2.60.

On the inside of the cover of this atlas a very full explanation is given of the colouring and the symbols employed in the maps, as well as a list of abbreviations used. The first sheet contains a set of plans to illustrate the scales employed in the production of maps, and this is followed by a series of maps showing typical methods of cartography employed to represent the relief of the Earth's surface. Several sheets are devoted to Germany, the remainder being such maps as are usually found in school atlases, both physical and political. The maps are free from the fault of being overcrowded with names, the physical maps are orographically coloured, political boundaries are distinctly shown, and the atlas is, in all respects, well adapted to the purpose for which it has been published.

Historical Geography. **Schrader.**

Atlas de Géographie Historique. Ouvrage contenant 54 grandes Cartes doubles en couleurs, accompagnées d'un Texte Historique au dos et d'un grand nombre de Cartes de Détail, Figures, Diagrammes, etc. Par une Réunion de Professeurs et de Savants sous la direction Géographique de F. Schrader, directeur des travaux cartographiques de la librairie Hachette et Cie. Paris: Hachette et Cie, 1894. Livraison 11e. *Price* 1 *fr.* 50 *c. Presented by the Publisher.*

Sheet No. 35 contains a map of the world in 1740, with insets of the English colonies, and French possessions in North America at that period. Sheet 39 is a map of the formation of the Indian Empire, commencing with the acquisitions under Lord Clive, 1756–1766, and ending with those under the Marquis of Dufferin, 1885-1886. As usual with this atlas, each map is accompanied by well written historical notes, illustrated by small maps.

The World. **Debes.**

E. Debes' Neuer Handatlas über alle Teile der Erde, in 59 Haupt und weit über 100 Nebenkarten, mit alphabetischen Namenverzeichnissen. Ausgeführt in der geographischen Anstalt der Verlagshandlung. Leipzig: H. Wagner & E. Debes. Parts XI., XII., XIII., XIV., XV., XVI., XVII., *Price* 1·80 *marks each Part. Presented by the Publishers.*

Part XI. contains the following maps: Climate map of the world, Austro-Hungary, South and Central Scandinavia; Part XII. Temperature, current, rain, population, and religion maps of the world, and maps of East Germany and West Africa; Part XIII. West Asia, Australia, and North America; Part XIV. Political and commercial maps of Europe, Southern Germany, and Balkan Peninsula; Part XV. Physical maps of the world in hemispheres, Spain and Portugal, and a general political map of Africa; Parts XVI. and XVII. (in one) Title and table of contents, political map of Asia, North-West Africa, South Africa, the Valley of the Nile, Equatorial Africa, Eastern United States, and a political map of South America.

With the issue of Parts XVI. and XVII. this atlas is complete. It contains in all 59 principal maps and numerous insets. The style in which the maps are drawn reflects credit on all who have had a hand in their production. Except in the case of general maps relating to physical geography, etc., each sheet is furnished with a copious index. The colouring is well chosen, and the hill-shading is not only effective, but, being in light brown, does not interfere with the lettering. The depths of the ocean are indicated by different shades of blue, and, taken as a whole, it is an excellent atlas for the purpose of general reference, while its price places it within the reach of many persons who cannot afford the more expensive atlases.

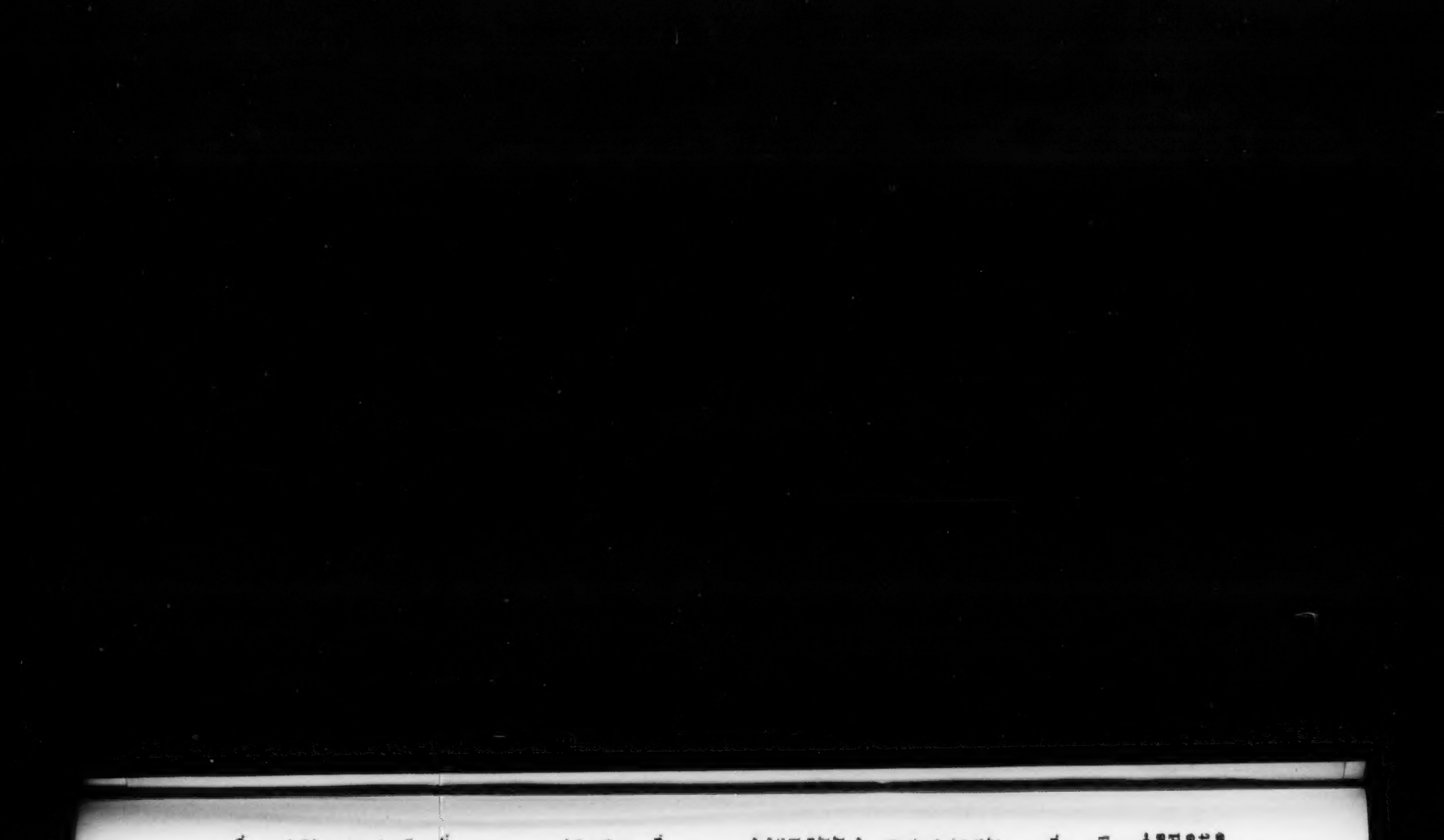
PHOTOGRAPHS.

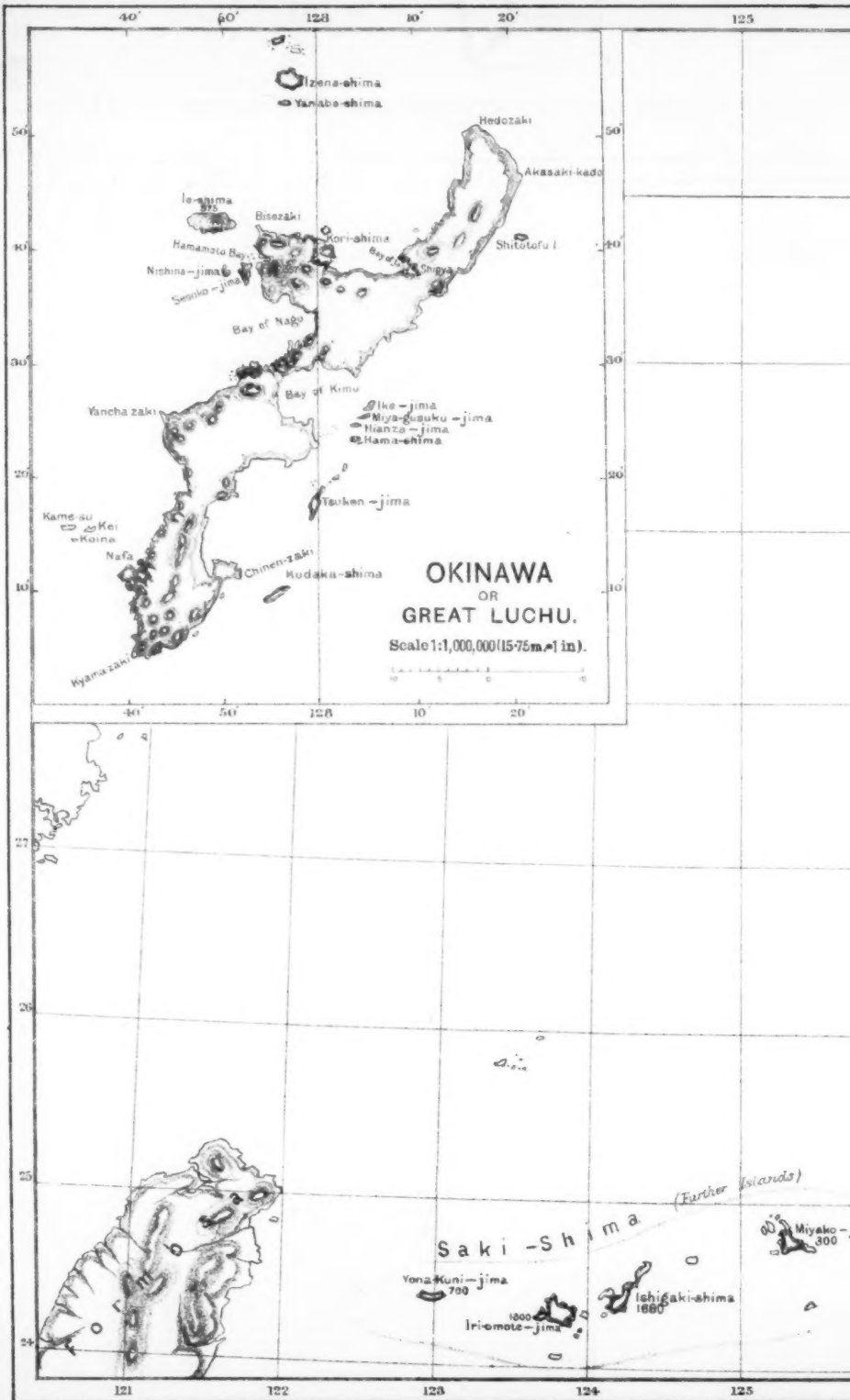
Bashan. **Robinson Lees.**

32 Photographs of Southern Bashan, taken by G. Robinson Lees, Esq., 1893. *Presented by G. Robinson Lees, Esq.*

This is a very interesting series of photographs illustrating the scenery and antiquities of Southern Bashan.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.





B.V.Darbishire.

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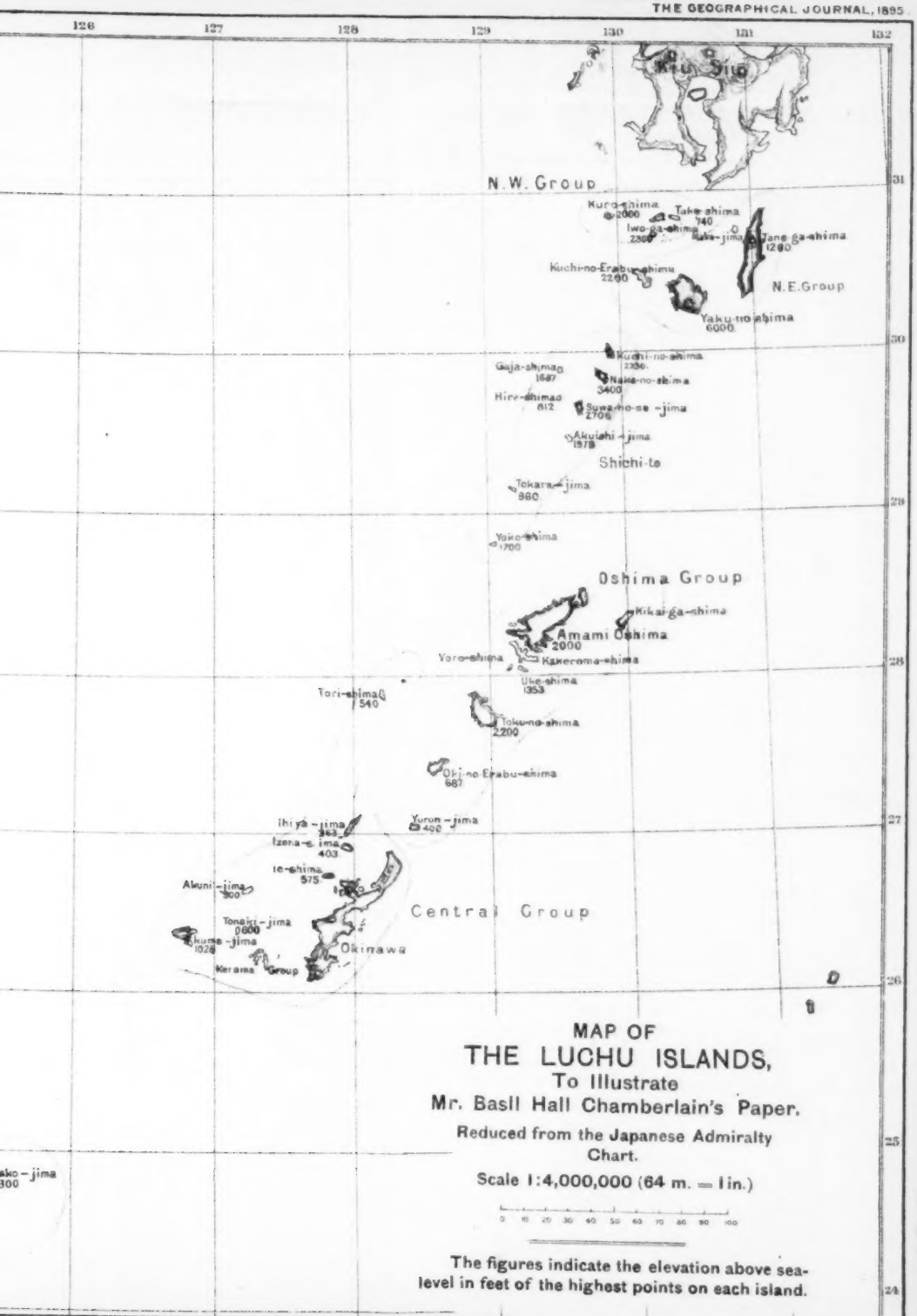
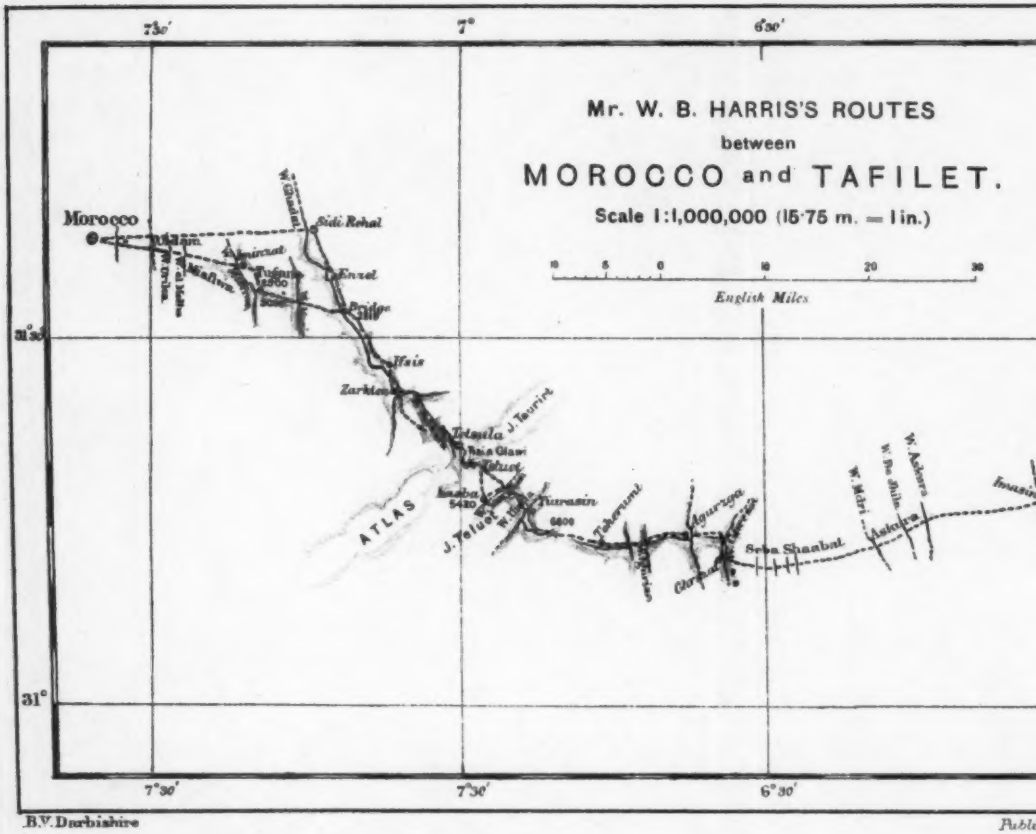


Vincent Brooks Day & Son lith.



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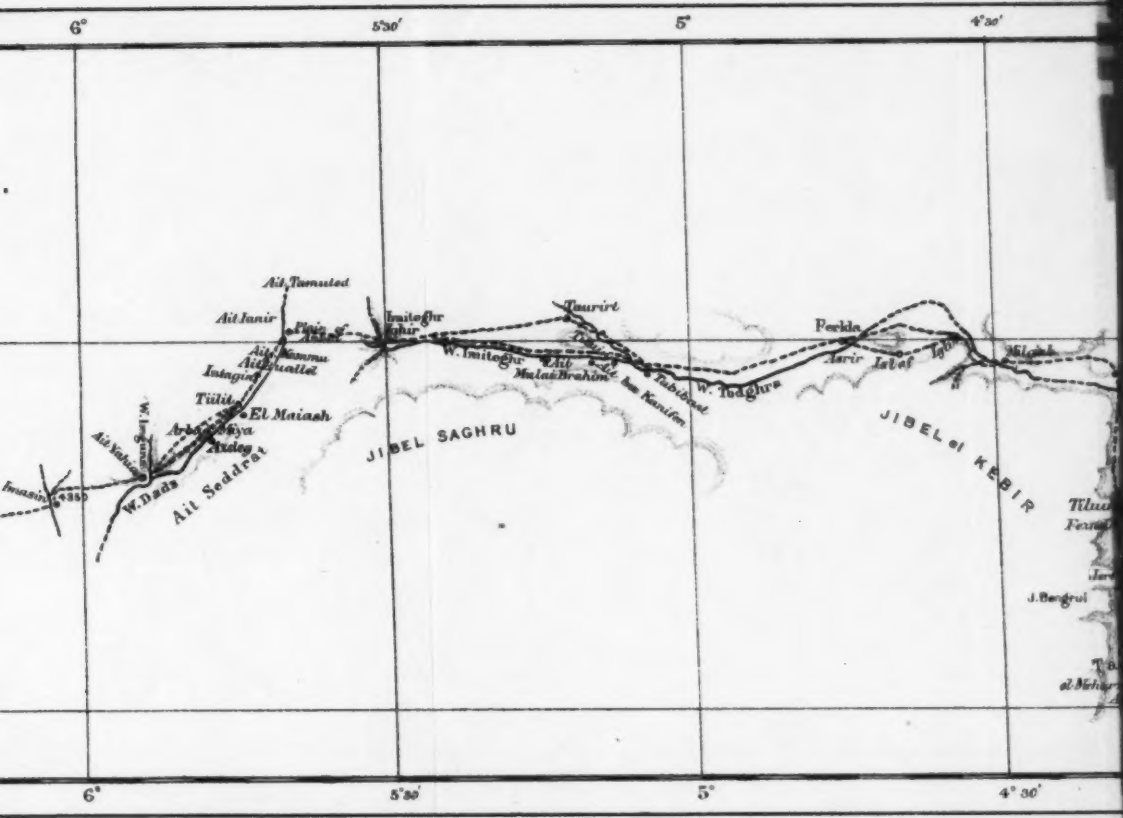

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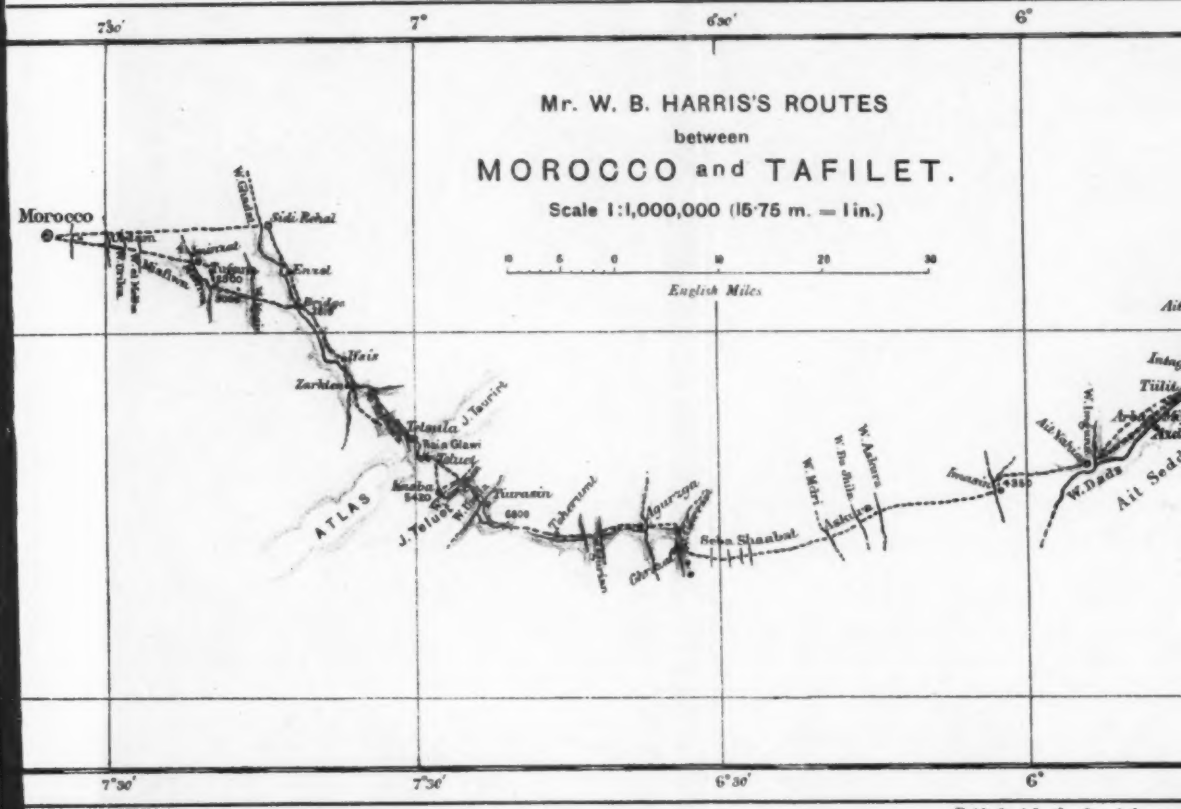

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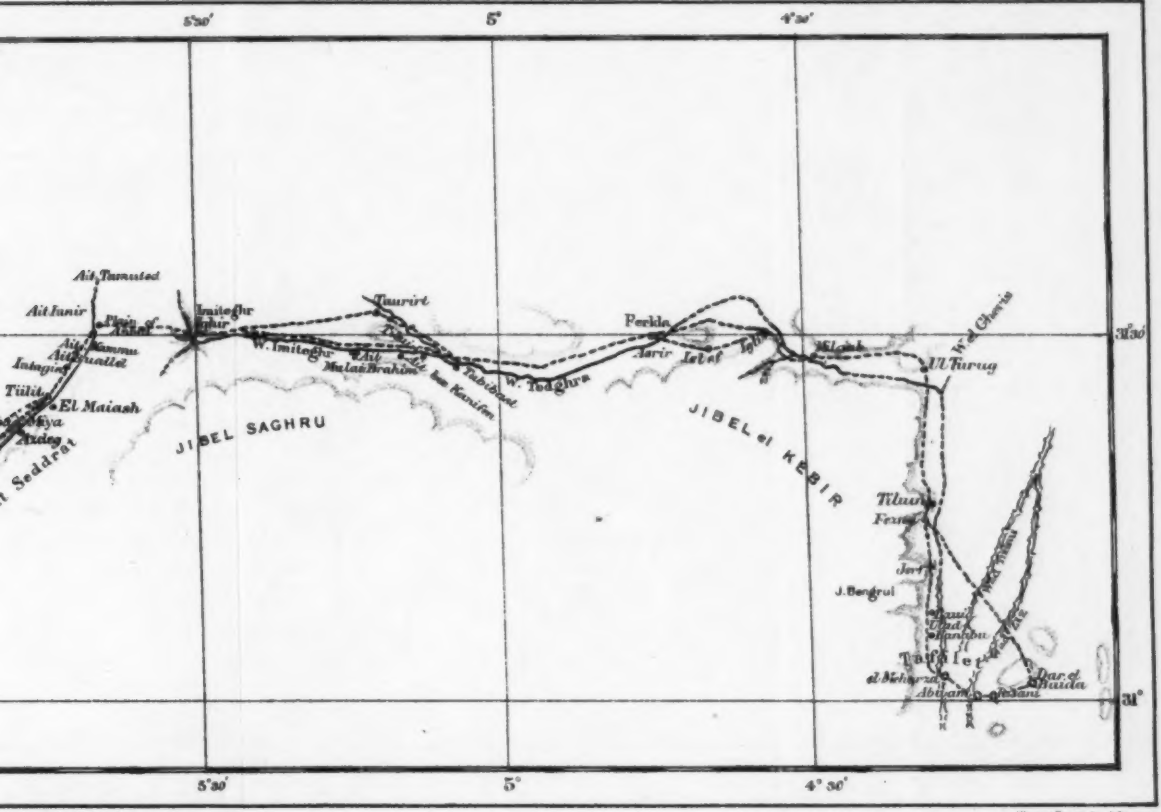

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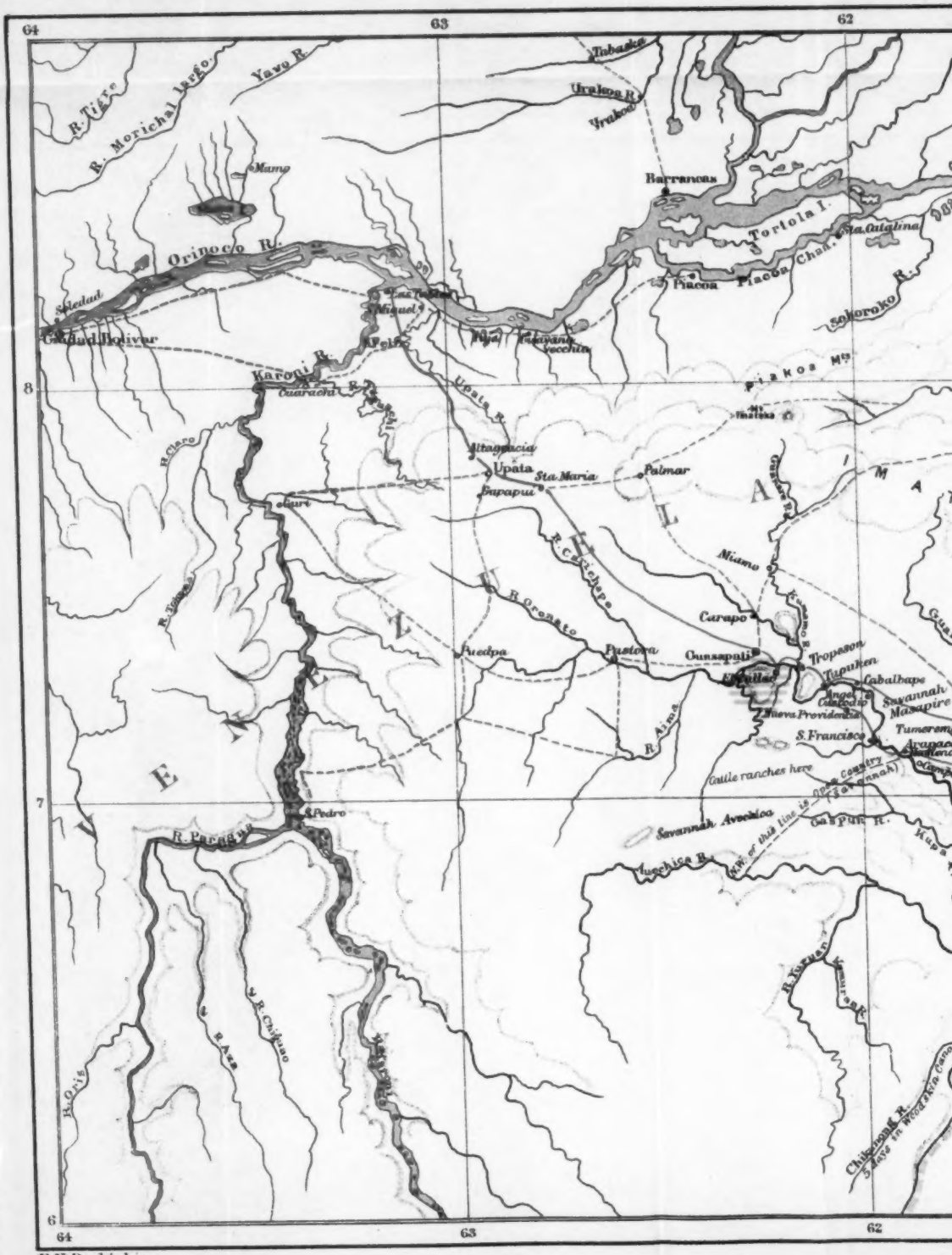

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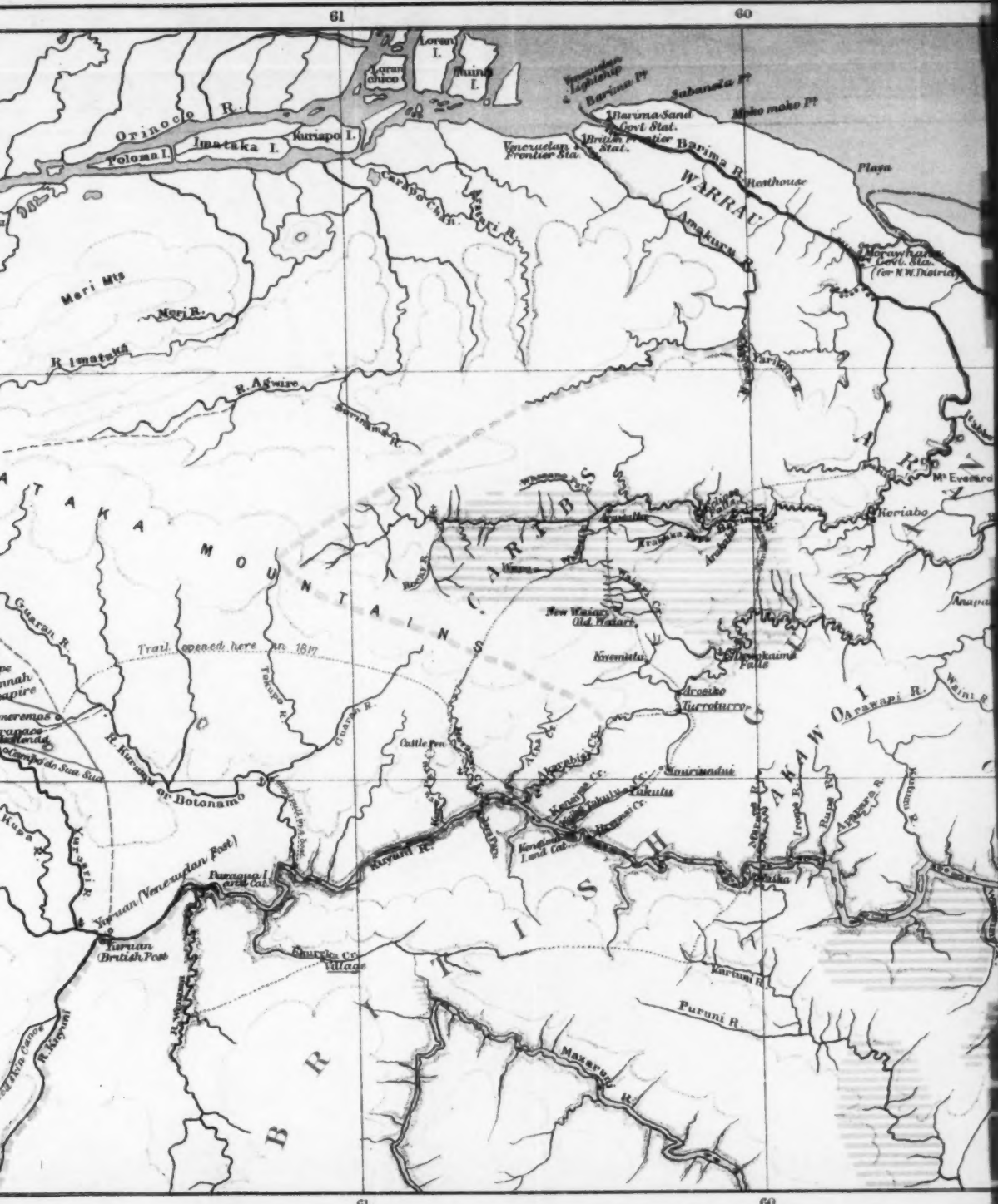
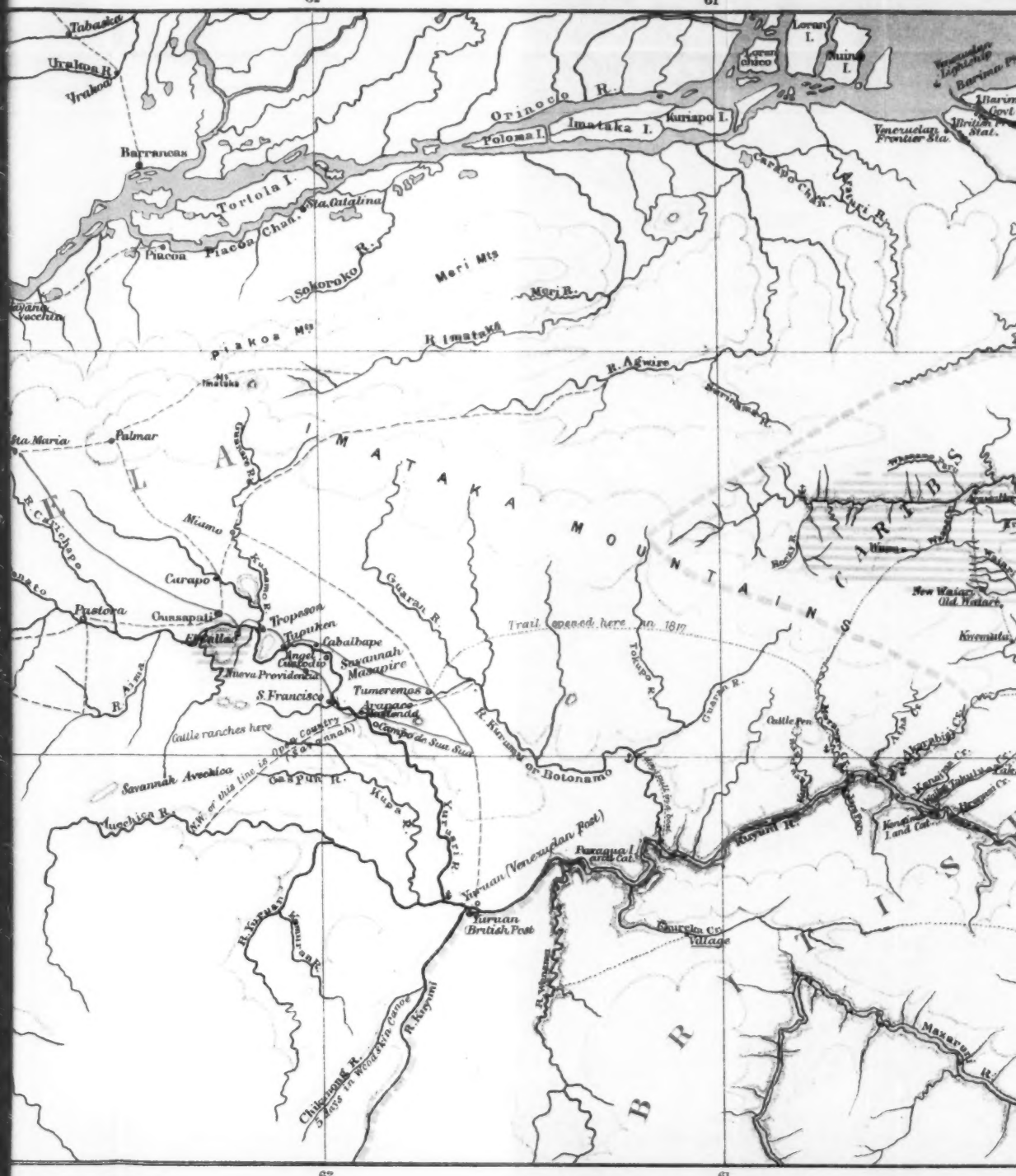
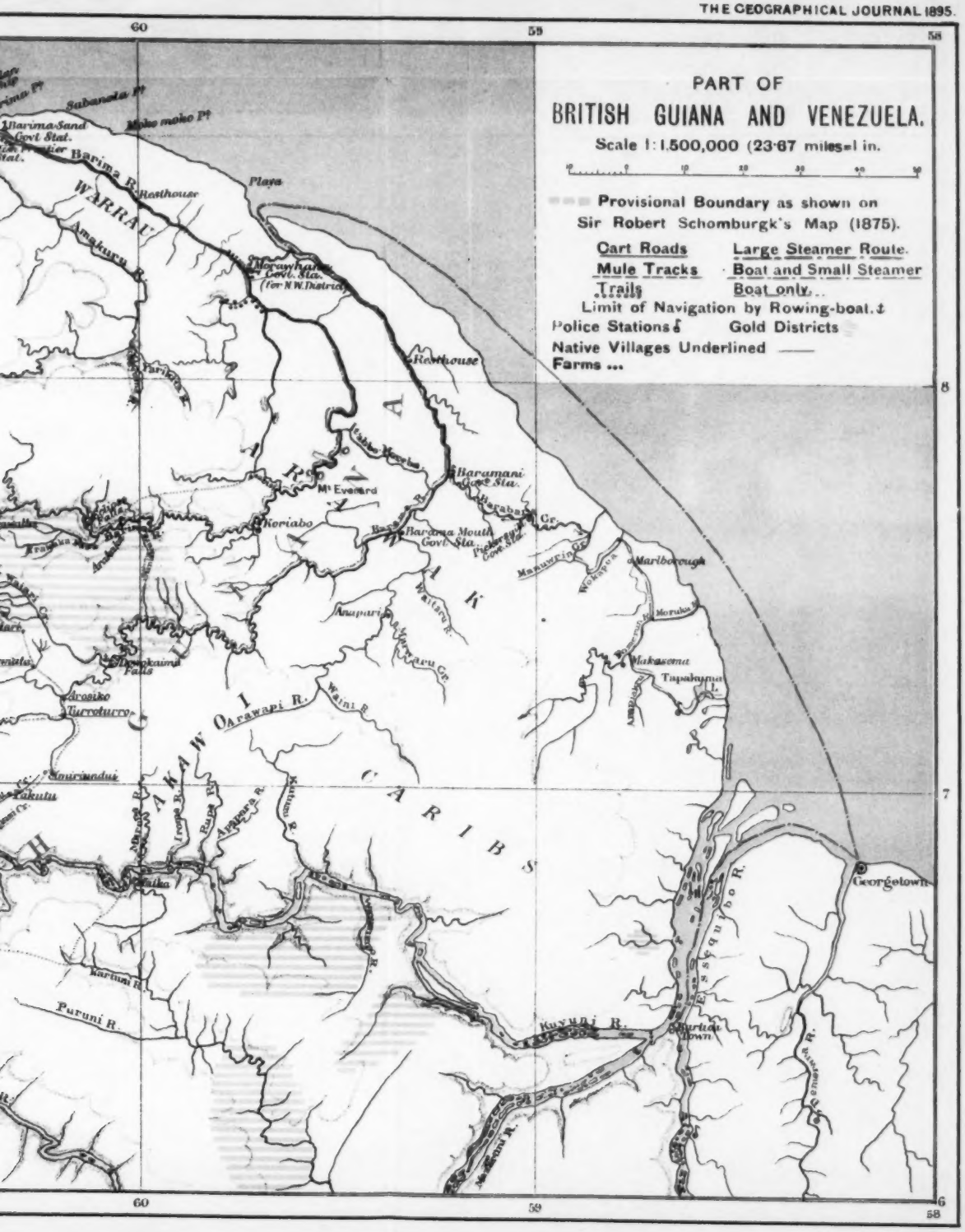

61
60
Orinoco R.
Loran I.
Loran chico
Iguino I.
Poloma I.
Imataka I.
Kurupo I.
Venezuelan Lighthouse
Barima Pt
Sabanseia Pt
Moko moko Pt
Barima Sand
Govt Stat.
Venezuelan Frontier Stat.
British Frontier Stat.
Barima R.
Manthouse
Playa
WARRAU
Amakuru R.
Mori Mts
Mori R.
R. Imataka
R. Aguire
Barima R.
Parishara R.
Mt Everard
Kioriabo
CARIBS
Whitehouse Falls
Kraneka R.
Arabisi R.
Waini R.
New Waini
Old Watark.
Kwemistu
Mowaikaima Falls
Arosiko
Turroburro
Arawapi R.
Waini R.
TAKAMOUNTAINS
Trail opened here in 1817
Guaran R.
Takuto R.
Guaran R.
Castle Pen
Kaiuma Cr.
Takutu
Kaiuma Cr.
Kaiuma Land Cat.
Kaiuma Cr.
Kaiuma Cr.
Sauriwadai
Kaiuma Cr.
Kaiuma Cr.
Kaiuma Cr.


62
61
Tabaske
Urakoa R.
Orinoco R.
Loran I.
Muina I.
Barrancas
Tortola I.
Piacoa
Piacoa Chan.
Sta. Catalina
Sokoroko R.
Mori Mts
Mori R.
Piakos Mts
R. Imataka
R. Aguire
Sta Maria
Palmar
Curapo
Pastora
Cunsapali
Tropason
Tupuken
Cabalbape
Angel Custodio
Nueva Providencia
Savannah Masapire
S. Francisco
Tumeremos
Avanaco
Castanda
Ocampo de Sua Sua
Cattle ranches here
Savannah Avechica
R. Aima
R. Avechica
R. Yuruan
Yuruan (Venezuelan Post)
Yuruan British Post
R. Kopuna
R. Kopuni
Chikisoma R.
3 days in Wood to canoe
Imataka Mts
Guaran R.
Trail opened here in 1817
R. Kurisapo or Botonamo
Tokapo R.
Castle Peak
Kopuna R.
Kopuni R.
Parapapo I. and Cat.
Kopuni R.
Yuruan I. and Cat.
Kopuni Cr.
Yuruan Cr.
Kopuni Cr.
Yuruan Cr. Village
Mazaruni R.
New Waiapa Old Watact.
Kororuta
Alimas Mts
Wapisana Mts
Roraima Mts
Venezuelan Lightship Barima
Venezuelan Frontier Sta.
Barima R.
Carapo Chan.
Kaiari R.
Kuriapo I.
Imataka I.
Poloma I.
Cerro Chico
Barima R.
Marin Govt Stat.
Mazaruni R.
R. Caruchapo
Miamo
Kamaipo R.
Aima
Alimas
Wapisana
Roraima
Arabisi Cr.
Kopuni Cr.
Yuruan Cr.
Kopuni R.
Yuruan I. and Cat.
Yuruan Cr.
Yuruan Cr. Village
Mazaruni R.
R. Yuruan
Yuruan R.


PART OF
BRITISH GUIANA AND VENEZUELA.
Scale 1:1,500,000 (23·67 miles=1 in.
Provisional Boundary as shown on Sir Robert Schomburgk's Map (1875).
Cart Roads
Mule Tracks
Trails
Large Steamer Route.
Boat and Small Steamer
Boat only.
Limit of Navigation by Rowing-boat.
Police Stations
Gold Districts
Native Villages Underlined
Farms
60
59
58
8
7
6
Sabaneta Pt
Moko moko Pt
Barima R.
Rasthouse
Plays
WARRAU
Amakura R.
Mt Everard
Koriabo
Barama Mouth Govt Sta.
Barama R.
Waruma Cr.
Marlborough
Makaseima
Tupakuma I.
Arawapi R.
Waini R.
Waruwau Cr.
Anapuri
Arosiko
Turvoturro
Amurinaduri
Yakutu
CARIBS
Aruka
Karima R.
Puruni R.
Roxwai R.
Georgetown
Essequibo R.
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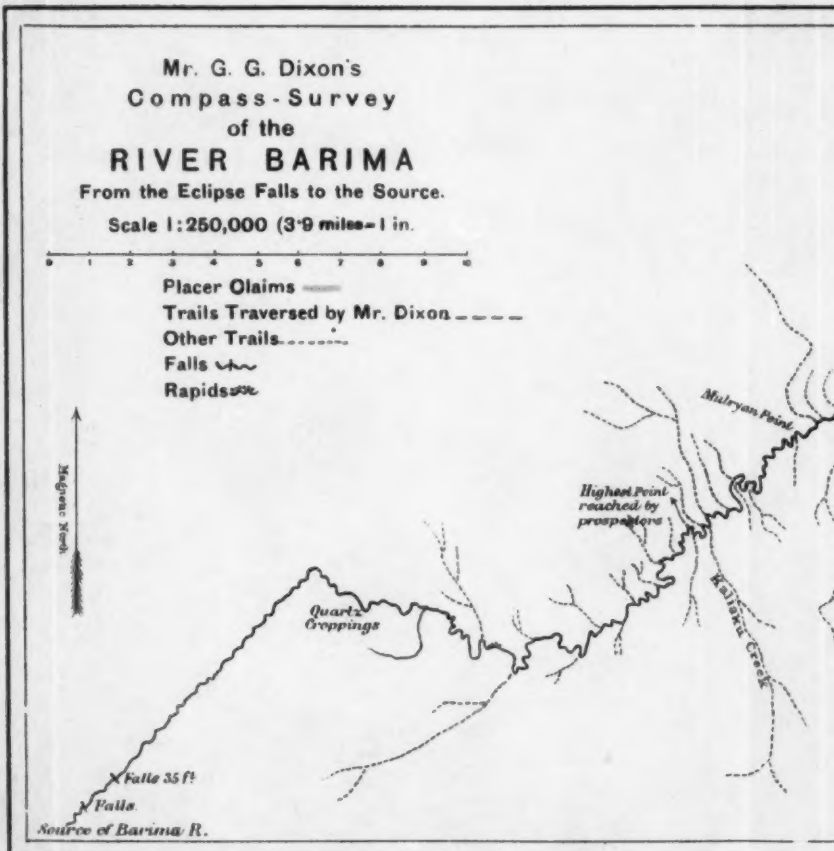

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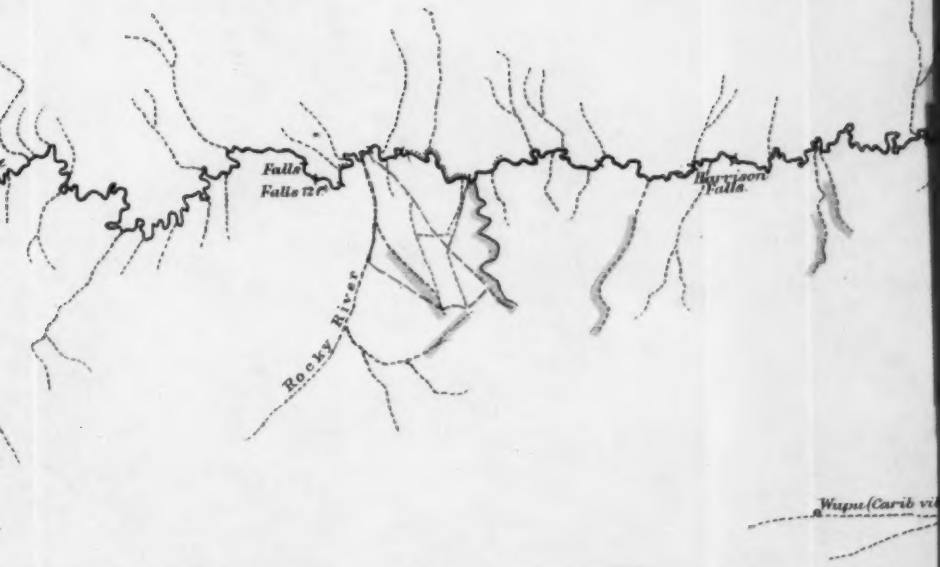

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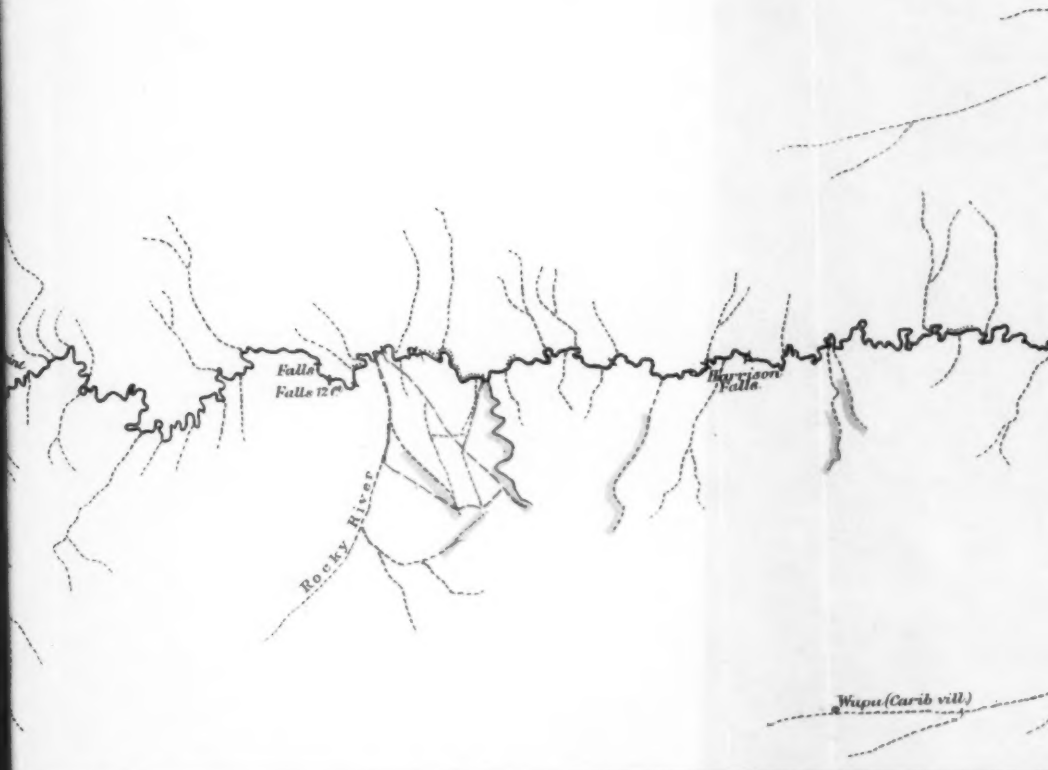

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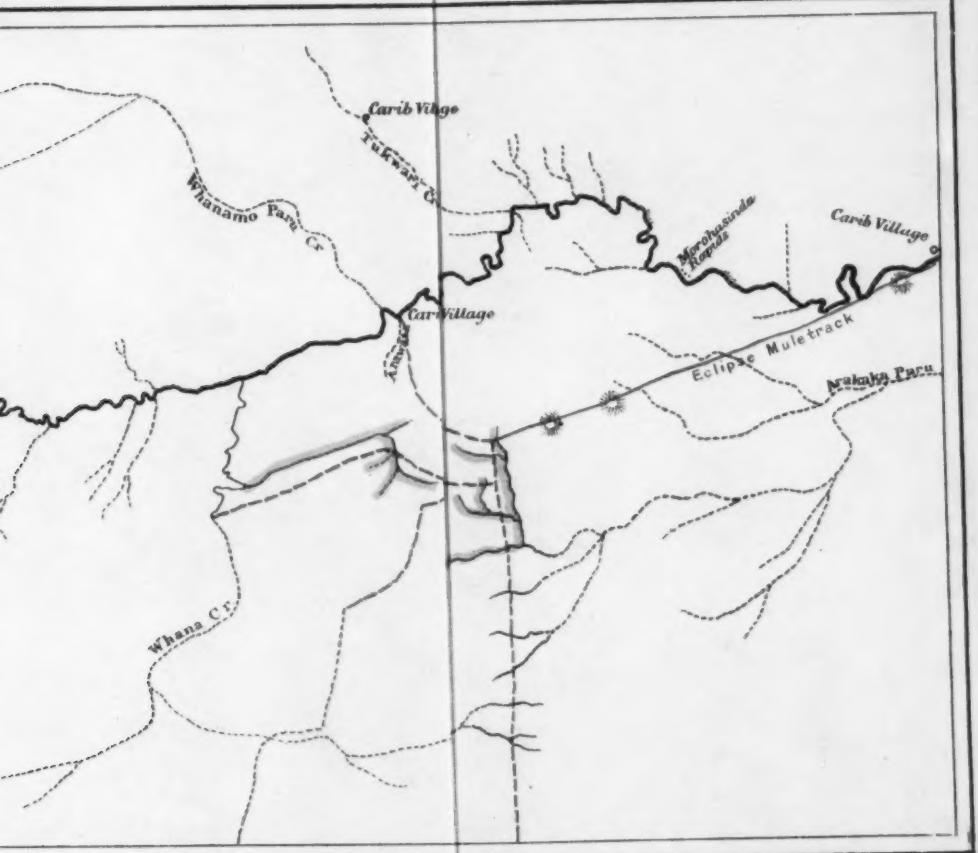

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